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Journal of Educational Research

Registered June 4, 1929

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THE JOURNAL OF EDUCATIONAL RESEARCH is indexed in the Education Index

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JOURNAL OF EDUCATIONAL RESEARCH

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THE JOURNAL OF EDUCATIONAL RESEARCH is published at Bloomington, Illinois, monthly, except July and August by the Public School Publishing Company. The subscription price is $4.00; $4.20 in Canada or Mexico; and $4.50 in other foreign countries.

Subscriptions and all communications about reprints or other business matters should be addressed to the PUBLIC SCHOOL PUBLISHING COMPANY, at Bloomington, Illinois.

Address all communications on editorial matters to A. S. Barr, Department of Education, University of Wisconsin, Madison, Wisconsin.

JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXV APRIL-MAY, 1932 Numbers 4-5

RESEARCH PROBLEMS AND TRENDS IN EDUCATIONAL SOCIOLOGY

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New York University

EDUCATIONAL sociology had its beginnings like psychology, educational psychology and some other subjects, in philosophical discussions. It is only within recent years and following the scientific development of sociology that educational sociology has attempted to free itself from the philosophical bias and to develop a body of scientific data upon which to base principles and conclusions. Our purpose in this article is to present as adequate a picture as possible of the research completed and under way in the field of educational sociology. It will be out of these researches that a body of facts will come, if at all, for intelligent educational reconstruction.

We shall discuss: first, the character of research completed and under way; second, the trends that this research is taking, and third, the fields in which research is needed. The consideration of these aspects of the problem will require an examination of the major investigations completed, the important studies under way, and the techniques used in the investigations so far projected.[1]

The types of research completed and under way may be roughly divided into two classes: first, factors in the social life affecting educational

[1] The method of gathering the data of this study was first by means of a letter addressed to members of the American Association of Educational Sociologists asking for facts on the following topics:

Title of research
Person by whom research is carried on
Institutional connection
Statement of the problem
Discussion of method or techniques used
Summary of findings
Further research projects under way
Fundamental research needed in the field of educational sociology
Remarks

The second method was by studying researches published and the third was by studying unpublished researches not reported by those to whom the letter was addressed, that is, the unpublished studies were examined so far as they were available.

procedure, and second, factors within the school organization itself which have a sociological bearing and significance. Under the first category there are several types of studies which require consideration and these may be grouped under three heads as follows:

GROUP I

A. Studies in social backgrounds.
B. Studies in various aspects of public health, in their sociological and educational significance.
C. Studies of social institutions and forms of anti-social behavior in their relation to the problem of education.

The second type of studies includes researches into:

GROUP II

A. The maladjustment of gifted children.
B. Problems of school administration and supervision.
C. Problems of educational institutions.
D. Problems of the curriculum.
E. Problems of method.

GROUP I-A

Perhaps the most important groups of studies in educational sociology are those being carried on by Professor Thrasher[2] of New York University in social backgrounds. A variety of separate projects connected with these studies are being undertaken such as special studies of

1. truancy
2. delinquency
3. religious education
4. commercialized recreation
5. the public library
6. social settlements
7. social backgrounds of the Italian school child
8. educative influence in a social block
9. social cost accounting
10. organization of the local community, etc.

[2] Professor Frederic M. Thrasher, New York University, is directing a number of projects, now in progress, in connection with The Boys' Club Study which is being financed by the Bureau of Social Hygiene, New York City.

Professor Thrasher says of his researches: "One of the major difficulties in such studies is the fact that human behavior results from a great variety of factors which together must be responsible for the behavior and problems of the child. It is necessary, therefore, to investigate not merely the influence of a given institution but in connection with such investigation to study all of the other social forces in the child's community and social world which may determine his behavior, and this is an exceedingly difficult if not well nigh impossible procedure. Here, then, is a very important field for scientific research.

"The variety of factors which condition and determine the conduct and character of children is indicated by a sociological study being carried on in connection with the investigation of the effects of a large boys' club in New York City. The methods of the study will be presented briefly here to indicate the necessity of dealing with a variety of divergent factors in order to understand the processes of character education and to measure character building agencies and institutions in the life of the child.

"The study in question has been set up in order to determine the effects of a large boy's club upon its members and, incidentally, upon the community itself. The club, which is housed in a $759,000 plant, equipped with gymnasium, swimming pool, game rooms, individual meeting rooms, cafeteria and other facilities, provides for 6,000 boys. It is located in what may be called an interstitial community. The assumption is that a boys' club prevents such problem behavior as truancy and delinquency, and this particular club was placed in this section because these problems were found to be acute there.

"In such a study it is necessary to use the comparative method. In the first place, the types of boys and their backgrounds, who are being influenced by the club, must be discovered, in order to determine whether the club is reaching the type of boy whose conduct needs most to be improved. Secondly, it is necessary to compare club boys with non-club boys to see if the same types of boys in the club become less problems, after participating in club activities, than those outside. In the third place, the boys who join the club must be compared with themselves before and after they join to determine whether or not, other things being equal, their conduct improves with participation in club activities.

"The scientific methods employed in this study may be summarized under three headings: (1) The ecological method, which is a study of

the distribution of various types of boys and the characteristics of their social backgrounds in the area of study.

"(2) The statistical method, which counts various types of boys and the characteristics which they display, in order to discover indexes and correlations and to indicate causal factors.

"(3) The case study method, which attempts to investigate the whole boy in his total situation as a person, in order to determine all the factors which play upon him and to give a basis for an analysis of his conduct in terms of the causes involved.

"The importance of the study of the total situation within which the boys and the club function is emphasized in order to understand the varied influences which affect the boy, in addition to the influence of the boys' club itself. The study is primarily an investigation of the whole boy in his total situation.

"One phase of the ecological approach is the development of maps. The area of total study, which has been determined by the distribution of boys' club members, includes a population of approximately 300,000 people who live in approximately 170 city blocks, or 17 sanitary districts (the sanitary district is the United States population census tract). A large base map is being developed, showing the distribution of various factors influencing boys in the total area of study. This makes it possible to compare changes in truancy and delinquency rates as they are more or less affected by the boys' club's areas of greatest influence.

"For the purpose of establishing more definite control groups and the possibility of a more intensive study of the social backgrounds of boys' club members and non-club boys, an area of intensive study has been established, including three sanitary districts of ten blocks each, making thirty city blocks, with an approximate population of 60,000 people or 10,000 families. The attempt is being made to account for every boy in the district of intensive study, in order to see what is happening to boys who are not in the boys' club, as well as to those who are. In this way, control groups are established among boys coming from the same social background who are members and non-members of the club.

"Another method of the study is the analysis of the social block which is a sort of sociological X-ray. The social block is made up of one block, including the two opposite sides of the same street, since the interaction takes place back and forth across the street rather than across the back yard. Each block is studied as a separate unit for later comparison

with other blocks. The distribution of the various types of boys is indicated on large block maps to reveal ecological correlations. For example, boys' club members, truants, non-members, delinquents, high school boys, employed boys and so on are spotted by individual tenements. In the same way, the distribution of characteristics of the boys' families are also plotted by tenement to establish indexes of morale, economic class, social level, social efficiency and so on, for families of club boys, as compared with non-club boys. For example, such factors as nationality, telephones in the home, registered voters, citizenship, agency contacts, occupations, mobility, housing, rentals paid, and so on are brought together for each family and tenement.

"The study is really an investigation of the anatomy of society studied histologically. The blocks are thoroughly analyzed, both statistically and ecologically yet the statistical and ecological methods are in themselves inadequate and incomplete. They must be supplemented by case studies and intimate documents bearing upon the life of persons, groups and institutions within the block, or which touch the lives of people dwelling within the given local area.

"Case studies of 60 boys from various parts of the area with different types of problems have been completed. Some of these boys are boys' club members and others are non-members. The methods used in these case studies are those that have been developed in behavior clinics and include the medical and physical approach, the psychometric and psychiatric examination, and the sociological investigation. The basic method here is the comparison of problem boys, both members and non-members of the club, in the same social environment, by carefully building up complete records of their behaviors and their backgrounds and analyzing the whole boy in his total situation to see what differences are introduced by participation in the boys' club activities.

"A new method developed in the Boys' Club Study is the use of superior boys in research. The superior boys are being studied in the same way as the problem boys, using all the methods of the standard case study and building up a complete record in order to analyze the factors in the superior boys' success, particularly those which are contributed by the boys' club itself. The superior boys have been selected on the basis of sociological criteria rather than psychological, namely, the success of the boy in his social group.

"The superior boys are used in observing their own community and in describing their social worlds and the local groups, institutions, and

customs with which they come into contact. This has been deemed to be a superior method because it gets at the boy's own interpretations of the life and value in his own social environment rather than that imposed by an outsider who goes in as a research investigator.

"It is hoped to determine, by the use of these methods, the sort of influence exerted by such an agency as a boys' club in preventing problem behavior and in functioning as a character building institution. The methods of investigation, however, are more widely applicable than to a boys' club and can be used in studying the influence of other institutions and groups. Such studies as this may be regarded as indispensable in developing and understanding the problems of education."

In connection with the Boys' Club Study, several community studies are under way which will indicate the interrelationships of the various educational organizations and processes in given areas. One of these studies is concerned with adult education, another with social conflicts arising with reference to school community relations and so on.

A special committee of the National Probation Association has been organized under the chairmanship of Dean Justin Miller of the Law School of Duke University to study the relations between the school and the juvenile court.

GROUP I-B

The second type of study under the first category is that relating to public health, carried out either by, or under the direction of, the writer. The most important of these were studies made in school communities of Public Schools No. 106 and No. 157 Manhattan and were designed to determine community practices relating to health and the extent to which community practices might be modified by school instruction. The first of these studies involved the social measurement of a school program.[3] A second group of studies relates to health backgrounds. One of these researches presents an analytical and statistical examination of mortality in twenty-one sanitary districts in negro Harlem and the educational problems involved.[4] These studies illustrate the type of investigation with which we are concerned.

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[3] Payne, E. G., and Gebhart. *Method and Measurement of Health Education.* New York: Association for Improving the Condition of the Poor, 1926.

[4] Nathan, Winfred B. *A Study of Health Conditions, in Harlem, New York, Based on a Full Five Years Mortality Record, With Implications for Health Education,* Doctor's dissertation, New York University, 1930.

GROUP I-C

Under this group may be listed several studies of significance. First is a study by Thrasher to determine the effects of motion pictures upon delinquency.[5] The methods used are descriptive, ecological, statistical, and case studies with particular emphasis upon the controlled interview.

Peters[6] has underway a study to determine the relation of the movies to the mores. This is a quantitative study of the amount and direction of divergence of activities portrayed in commercial motion pictures from approved standards of morality in respect to the four elements of the moral code. An elaborate set of scales has been built up for quantitatively measuring the mores on the one hand and the content of motion pictures on the other hand and for expressing in quantitative terms the amount of divergence between them. Approvals have been measured in some fifteen type-groups, and about 250 motion pictures have been rated. This is the first time that quantitative methods have been applied to the measurement of the mores.

Bowden[7] has completed a study in method not unlike the one undertaken by Peters. He has constructed and administered a test for magic in the common population of the United States, contacting the parents of sixth grade pupils in thirteen states. The study is largely statistical.

GROUP II-A

Of the studies centering around the school may be included a group of researches under the direction of Zorbaugh[8] on the maladjustment of gifted children. Clinical methods are used in which the sociologist, the psychiatrist, the psychologist, the physician and the case worker come together to determine the nature and causes of the maladjustment of the children under examination, and to place each person in a social situation for purposes of effecting adjustment.[9] Careful records are kept of each step in the procedure with the expectation that ultimately a body of scientific data pertinent to child guidance and data of supreme import-

[5] Thrasher, Frederic M. *The Effect of Motion Pictures Upon Delinquency.* Now in progress. Further information may be obtained from Professor Thrasher, New York University.

[6] A study in process under the direction of Professor C. C. Peters, Pennsylvania State College.

[7] Bowden, A. O. State Teachers College, Silver City, New Mexico. Study completed in 1931. Unpublished.

[8] Zorbaugh, Harvey W. New York University. Unpublished.

[9] Watson, Maud E. *Emotional Factors in the Lives of Parents Which Affect the Behavior of Children,* Doctor's dissertation, New York University, 1930. This has now been published by F. F. Crofts and Company, New York, 1932.

ance in the development of educational sociology will be available. Simple case studies have been made of maladjusted children by Peters[10] and Reavis.[11]

Fairchild[12] investigated conduct habits of Boy Scouts in a study authorized and supported by the National Council of Boy Scouts of America. He selected ten communities at random, scattered over the country, and attempted first, a statistical study on the basis of juvenile court records to determine the relative frequency of delinquency among scouts and non-scouts, and second, a personal study of 100 boys in each community, divided into four groups of 25 to each group as follows: (a.) scouts with a delinquency record; (b.) non-scouts with a delinquency record; (c.) scouts without a delinquency record; and (d.) non-scouts without a delinquency record.

The purpose of the study is to furnish data to the scout organization itself which will serve as a basis for either the reinforcement of present methods and policies or the adoption of promising modifications.

Thomas[13] has conducted an extensive research study on "techniques for the study of child behavior." She places the emphasis upon the need of techniques for recording behavior objectively and the method is to split up behavior into certain elements which can be recorded reliably and objectively and which can be related to the whole. This technique requires the tracing of the progress of the given child over a given period of time, indicating contacts with things and persons. Records are in terms of gross activity and time spent on various types of activities, social and material. The method of recording the behavior responses, including conversation, is through the use of a stenographer concealed behind a screen. The value of Dr. Thomas's work lies in its contribution to an objective technique for the study of social behavior.

GROUP II-B

In the field of administration and supervision there are occasional studies, the most noteworthy of which is that made by Counts[14] in Chicago.

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[10] Unpublished materials. C. C. Peters, Pennsylvania State College.

[11] Reavis, W. C. *Pupil Adjustment.* (New York: D. C. Heath and Company, 1926), p. 348.

[12] Fairchild, H. P. *Conduct Habits of Boy Scouts.* (New York: Boy Scouts of America, 1931), p. 81.

[13] Thomas, Dorothy S. *Some New Techniques for Studying Social Behavior.* (New York: Bureau of Publications of Teachers College, Columbia University, 1929), pp. 213.

[14] Counts, George S. *Schools and Society in Chicago.* New York: Harcourt, Brace and Company, 1928.

Counts made a careful study of the social forces in Chicago which affect the operation of the schools. He points out not only the difficulties but the failures of school administration in that city because of inadequate attention to these social forces operating in the social process. The method used in this study was the historical, that is, consultation of documents, and the interview. The material was treated analytically and descriptively.

GROUP II-C

Researches into the growth and change of educational institutions are not numerous but one investigation of this type, undertaken by Chapin,[15] is worthy of presentation. It is concerned with cycles of growth in a university with reference to differences of structure (tensions, imbalances, trends, etc.) at different periods of the growth cycle. Some suggestion of the techniques to be used are outlined in the author's study[16] where political institutions are analyzed.

GROUP II-D

Perhaps the most widespread interest in research is in the curriculum including extra-curricular activities. Chapin is doing some outstanding work in this field. The details of two of his researches follow: I,[17] *Statement of problem:* to survey the facts of student extra-curricular activity in a state university. Methods and techniques used were those of collecting the facts by schedule, questionnaire and interview as well as by consulting records of student organizations. *Summary of findings:* Extra-curricular activities at the University of Minnesota. Extra-curricular campus organizations active in 1925 numbered 300, while 233 others had "died" in the period 1887-1925. Students participating numbered 4,637. Upper classmen were more active than under classmen, and women were more active than men. About 33 percent participated in religious activities, with increasing proportion from freshmen to senior years. Slightly more than one-third earned money while in school. One-third of the students did not participate in activities at all, while 40 percent participated in two or more activities. Period of greatest activity was senior year. Honor students participated in more activities than other students. Extensive and intensive participation were positively correlated. Students in five or more activities showed higher academic

[15] Chapin, F. Stuart. *School and Society*, XXIII, February, 1926, 212-216.
[16] Chapin, F. Stuart. *Cultural Change*. New York: Century Company, 1928.
[17] Chapin, F. Stuart, and Mehus, O. M. *Extra-Curricular Activities at the University of Minnesota*. Minneapolis: University of Minnesota Press, 1929.

achievement than those in two or three, and the latter were higher than non-participants. Students in intellectual activities, achieved better than those in social or athletic activities. There seemed to be a carry-over from student to community activities in later life, both as regards type and number. Majority of alumni (63.6 percent) considered extra-curricular activities to have equal or greater value than classroom work requiring the same amount of time. II, *Summary of findings:*[18] Extra-curricular activities of college students, a study in college leadership. A study of data pertaining to 250 young women, members of the senior class of Smith College. The study included: (1) extra-curricular activities, (2) academic grades, and (3) the physical condition of each student. Each student was given a certain number of points for each of these items, and correlations were made between them. The correlation between (1) and (2) was plus .402, between (1) and (3) plus .160, and between (2) and (3) plus .209. It was thus found that the more active students are the better scholastic students. It was also found that the persons who were active in many things were more intensely active in several things than persons with fewer activities.

Loftus[19] carried out under the direction of the writer, studies in the field of the curriculum. Assuming the validity of the major objectives of health, accident and fire prevention, worthy home membership, vocational insight and guidance, citizenship, thrift, desirable use of leisure time, ethical character, and command of the fundamental processes as representing fields of experience in which every normal individual is constantly called upon to participate, the experiment attempted to find out whether such a curriculum is feasible in a typical large overcrowded elementary school in New York City.

The steps in the experiment were:

A. A survey of the needs, interests, and educational assets of the children and the community.

B. The adoption of a number of specific objectives under each of the major objectives to meet the conditions revealed in the survey.

C. A survey and evaluation of all the classroom activities set up to attain these specific objectives.

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[18] See *School and Society*, February, 1926. pp. 212-216.

[19] Loftus, John J., formerly Principal of P.S. 80, Brooklyn, now District Superintendent of Schools, New York City. For further information see the thesis of Dr. Loftus, written at New York University.

D. A similar survey of the larger school activities under each of the specific objectives.

E. A tabulation and ranking of all the devices reported in the plan books of 63 teachers to attain these objectives.

F. Evidence to show the democratic coöperation of the teachers, the children, and the community in building the projects curriculum together with suggestions for extending the curriculum to cover a larger field. Among the interesting features is a community definition of citizenship involving the school objectives and worked out by the local chamber of commerce. Another is a character report constructed by teachers and pupils in which pupils set their own goals, indicate progress, and are rated by the parents as well as by teachers. It is interesting to note that the correlation between teachers' and pupils' judgments of conduct is .78.

The numerous changes in behavior in the pupils and the community seem to justify the conclusion that a project curriculum is feasible in the public elementary schools.

A study of considerable importance made by Douglass[20] deals with the factors conditioning high-school students. The hypothesis upon which the investigation proceeded is as follows: The work the child does in school is conditioned by factors outside of the school. The school cannot function properly unless these factors are known as to type, extent, and their influence upon the work the child does in school. Two hundred and seventy-nine pupils from grades seven to twelve, inclusive, drawn from a zigzag area which conforms very closely to the banking area and the commercial area of the community were included in the study which extended over a period of five months.

I. Findings were determined by
   1. Group-study schedules of (a) the child, (b) the father, and (c) the mother.
   2. Leisure-time questionnaire of (a) the child as to (1) waking hours, (2) hours under the influence of the school, (3) how he spends his time outside school hours each day of the week, and (4) how the child spends Saturdays and Sundays.
   3. Schedules on physical environmental conditions in the home.
   4. Questionnaires on how the vacation was spent.

II. Sources of information
   1. Schedules
   2. Questionnaires
   3. Visits
   4. Interviews

III. Checks upon the material collected
   1. Signatures of parents or guardian.
   2. Visits and interviews with the child and the parent in school, at home, upon the street, and at times when they were not aware that a check was being made.

IV. Tabulation of data
   1. Comparison with marks received in school as shown by:
      a. Record of school marks
      b. Data collected
   2. Material for the seventh, eighth, and ninth grades was tabulated separately from the tenth, eleventh, and twelfth grades.

GROUP II-E

In the field of method comparatively little has been done, but Staleup[21] has carried out some research which is highly suggestive of future possibilities. He has completed a study of conflict, coöperation, and leadership in their relationship to the sociological bases of methods of teaching. The problem as stated consisted of two parts: first, the historical, being a study of the sociological literature on the nature, types, and significance of conflict, coöperation, and leadership; second, which represented the field work in the study, was on the nature, types and social significance of conflict, coöperation, and leadership in the school by the use of a diary in the hands of a "participating observer" to discover the extent to which conflict, coöperation, and leadership existed and were made use of by the school in the teaching process.

In this study the data of the field work were obtained by the use of a diary in the hands of a "participating observer." The "participating observer," a member of the group, makes observations and keeps the record. This method of gathering data has been little used.

The discussion of the problem of needed research in the field of educational sociology is exceedingly difficult because of the mass of material to be condensed into so limited a space. As a matter of fact the mere enumeration of topics would require more space than we have at our dis-

[20] Douglass, Harvey. "Factors Conditioning High School Students," *Journal of Educational Sociology*, April, 1929, p. 492.

posal. We have just begun research into social backgrounds for purposes of making an educational procedure more intelligent and this work should be continued on a larger and more extended scale. Also, studies in administration, supervision, curriculum, school organization and measurement demand the attention of sociologists. Much work has been done in these various fields but their social aspects have scarcely been touched. Perhaps a listing of some specific fields which need research will have to suffice. Some of these are:

1. The relation of education to the problem of community health.
2. The relation of standardized curricula, school activities and method instruction to variations in local communities.
3. The education of cultural and racial minorities.
4. The school use of community resources.
5. The use by the community of school resources.
6. The control of education by social forces in the community.
7. The use of leisure time in relation to the school.
8. The relation of the school to crime prevention.
9. The sociological significance of various curricular changes in the recent past.
10. The sociological determination of curricular requirements by special studies of community needs.

The purpose in this presentation of researches in educational sociology has been to indicate the high spots in research by giving concrete examples of different types of research completed or in process. No effort has been made either to indicate all researches undertaken or to describe, completely, those presented. It is clearly evident that a group of educational sociologists are working earnestly to make of their chosen field a science and, through their research, to gather data and make their methods objective. What is not evident from the data here presented, but is important, is the trend of educational sociology in the past few years that has indicated an increased tendency toward objectivity, toward refinement of method in accordance with scientific techniques and towards a definition of problems in terms of the measurement of the results of educational processes for social efficiency. In general, there has been a decline in the uncritical use of old-fashioned questionnaires and in the choice of subjects of research projects involved in the use of purely see-

[21] Staleup, Benjamin F. A Study of Conflict, Coöperation and Leadership in Their Relationship to the Sociological Bases of Method and Teaching, Doctors Dissertation, 1927.

ondary sources. The tendency has been, moreover, away from opinion towards fact, and there has been a definite move to discard naïve methods in favor of controlled and validified techniques, and, furthermore, away from the bookish type of study toward the more vital topics involved in education.

The trend has been in the direction of regarding educational sociology as belonging to the field of sociology rather than to education, and to use the better techniques of the sociologist in educational research. The research, also, fortunately, has not been limited strictly to the field of school education, but has more and more extended to the sphere of non-school educational agencies and the influence of social backgrounds in the development of personality, always, of course, with the thought in mind of the relation of these agencies and backgrounds to the school and its problems.

A survey of the researches in educational sociology in the past decade promises a marked development in the future and a contribution to education of the most significant kind.

PROBLEM SOLVING IN ARITHMETIC

B. A. STEVENS
Director of Research
Ohio Education Association

IT is not uncommon for supervisors to suggest to their teachers that the failure of a pupil in solving reasoning problems in arithmetic are due, in large measure, to deficiencies in reading abilities. There is no lack of logic in the belief that a pupil who is unable to understand the situation described in a problem will find himself unable to solve it. Ability to read a printed problem correctly is undoubtedly essential to its correct solution. But does it necessarily follow that high abilities in solving reasoning problems in arithmetic are accompanied more frequently by high reading abilities than by high abilities in the fundamental operations in arithmetic? What are the relationships of the ability to solve reasoning problems? This study was undertaken for the purpose of obtaining further statistical evidence that might be used to supplement the "common sense judgments" on which instruction in this field has commonly been based.

The correlation method was employed in this study, using as data the scores obtained by standard tests of pupils in grades three to seven, inclusive. The four variables among which intercorrelations were calculated follow:

(1) Ability in silent reading.
(2) Power in the fundamental operations of arithmetic.
(3) Power in solving reasoning problems in arithmetic.
(4) "General intelligence" test scores.

These relationships were measured in five different localities, in order to be sure that the findings were not merely local in their significance. One group of 195 pupils, in the fourth, fifth, sixth, and seventh grades of the Henrietta-Caroleen school system, typifies well supervised mill-village schools in North Carolina. Another group of 495 pupils in the fourth, fifth, sixth, and seventh grades of Shelby, North Carolina, typifies unsupervised schools in small cities. A group of 156 pupils, in the third, fourth, fifth, and sixth grades of The Lincoln School of Teachers College, typifies the highly developed experimental school. A group of 239 pupils in grades three to six inclusive of Public School No. 157, New York City, typifies the large city elementary school. And a final group of 2004 pupils, selected at random from grades three to six of the Florida public

schools, typifies all the sizes and varieties of schools found in a state-wide survey.[1]

In Shelby and in Henrietta-Caroleen the entire testing program, by which the data were secured, was under the personal direction of the author. All tests were administered and scored by the author with the assistance of a small group of specially trained teachers. In Public School No. 157, New York City, the Stanford Reading Test, the Stanford Arithmetic Test, and the Stevenson Problem Analysis Test were given by the author with the assistance of a group of graduate students majoring in elementary education at Teachers College, Columbia University. The scoring of these tests was done by the author. The measure of the "intelligence" of each pupil was taken from the permanent records on file in the office of the principal. The tests from which these scores were secured had been given by competent officers of the New York City schools. All of the data for the Lincoln School were taken from the records on file in the office of the school statistician. The data for the Florida public schools were taken from the records obtained by the Florida State Survey Commission.

Attention is called to the fact that a variety of measuring instruments was used in the acquisition of the data employed in this study. The tests used with each group of pupils are indicated in Table I. This variety of measuring instruments was used in order to reduce the chance that the findings might be affected by a possible lack of validity in any one set of measures.

TABLE I

Schools Tested	No. of Pupils	Test Employed for Measuring			
		Reading	Fundamentals	Reasoning	Intelligence
Shelby	495	Stanford	Stanford	Stanford	Multimental
Henrietta-C.	195	Stanford	Stanford	Stanford	Multimental
P. S. No. 157	239	Stanford	Stanford	Stanford	Otis Group
Lincoln	156	Stanford	Stanford	Stanford	Stanford-Binet
Florida	2004	Th.-McCall	Woody-McC.	Stone (New)	Pintner Rapid Survey
	3089				

All of the zero order coefficients of correlation were calculated by the product-moment method, using the correlation charts devised by Dr. Truman L. Kelley of Stanford University. The double-checking feature of these charts eliminates many of the possibilities of errors in calculation.

Table II gives for each school in tabular form the zero order coefficients of correlation and their probable errors.

[1] The author acknowledges here the permission kindly given him to use these data from the Florida State Educational Survey by Dr. G. D. Strayer, the director of the survey.

TABLE II

ZERO ORDER COEFFICIENTS OF CORRELATION AND THEIR PROBABLE ERRORS BY SCHOOLS

School	r_{12}	r_{13}	r_{14}	r_{23}	r_{24}	r_{34}
Shelby	.67 ± .017	.70 ± .015	.76 ± .013	.75 ± .013	.64 ± .018	.69 ± .021
H.-Caroleen	.71 ± .024	.75 ± .021	.85 ± .013	.84 ± .014	.76 ± .02	.75 ± .021
P. S. No. 157	.64 ± .026	.64 ± .026	.60 ± .028	.70 ± .022	.61 ± .027	.61 ± .027
Lincoln	.81 ± .019	.83 ± .017	.80 ± .019	.89 ± .011	.81 ± .019	.82 ± .018
Florida State	.64 ± .009	.64 ± .009	.70 ± .008	.74 ± .007	.68 ± .008	.69 ± .008

Variables 1—Reading 2—Fundamentals 3—Problem Solving 4—Intelligence

The coefficients of correlation in this table indicate a relatively high relationship between any two of the traits under consideration. No marked distinctions can be observed among the relationships obtaining between any two traits. On the whole the coefficients of correlation between any two traits are higher and more uniform for the Lincoln School than for any of the other schools studied. A tendency may also be observed for the coefficients of correlation between arithmetic fundamentals and arithmetic problem solving (r_{23}) to run slightly higher than the other coefficients involving problem solving.

Following the calculation of the zero order coefficients, the first and second order partial correlation coefficients were computed. Table III shows the first order coefficients, which were derived from the zero order coefficients and were in turn used in the calculation of the second order coefficients.

TABLE III

FIRST ORDER COEFFICIENTS OF (PARTIAL) CORRELATION BY SCHOOLS

School	$r_{12.3}$	$r_{13.2}$	$r_{14.2}$	$r_{14.3}$	$r_{23.1}$	$r_{24.1}$	$r_{24.3}$	$r_{34.1}$	$r_{34.2}$
Shelby	.31	.43	.58	.54	.53	.27	.26	.34	.41
H.-Caroleen	.22	.40	.58	.54	.66	.42	.36	.32	.32
P. S. No. 157	.35	.35	.42	.34	.49	.37	.32	.36	.32
Lincoln S.	.28	.41	.42	.37	.67	.46	.31	.47	.37
Florida State	.32	.32	.47	.47	.49	.42	.35	.44	.38

Variables 1—Reading 2—Fundamentals 3—Problem Solving 4—Intelligence

One of the most interesting facts revealed by Table III is that, except for the relations between reading (1) and "intelligence" (4), the highest partial correlation coefficients are between fundamental operations (2) and problem solving (3) after the effect of reading ability has been rendered constant ($r_{23.1}$). In each school this relationship is ten or more one-hundredths higher than the relationship between reading and problem solving with achievements in the fundamental operations held constant ($r_{13.2}$).

The second order coefficients, derived from the first order coefficients of Table III, are presented in Table IV.

TABLE IV

SECOND ORDER COEFFICIENTS OF (PARTIAL) CORRELATION BY SCHOOLS

School	$r_{12.34}$	$r_{13.24}$	$r_{14.23}$	$r_{23.14}$	$r_{24.13}$	$r_{34.12}$
Shelby	.21	.26	.49	.48	.11	.25
H.-Caroleen	.04	.28	.52	.61	.30	.07
P. S. No. 157	.27	.25	.34	.42	.23	.22
Lincoln School	.19	.30	.31	.58	.23	.24
Florida State	.19	.17	.40	.37	.26	.30
Mean coefficient	.18	.25	.41	.49	.23	.22

Variables 1—Reading 2—Fundamentals 3—Problem Solving 4—Intelligence

Before any interpretation is made of these coefficients, one must be warned of some of the fallacies which characterize inferences made from partial correlation coefficients. In the coefficient $r_{13.24}$, it is not known how extensively the skills involved in reading and in problem solving have been partialed out through holding constant the factors "power in arithmetic fundamentals" and "intelligence." Certainly, in the measurement of intelligence, a significant amount of weight should be attached to problem solving ability. Perhaps then, when one holds "intelligence" constant, one partials out much of the problem solving trait with which one is correlating reading ability. The same warning must be given regarding the partial correlations of reading and intelligence. In other words, no one of the four traits with which this study is concerned can be considered as a separate and distinct compartment of the mind. There is close interrelation among all of them, and many of the specific skills which go to make up strength in one trait may contribute significantly to the strength of each of the other traits. Hence, in partialing out traits x and y, one is undoubtedly holding constant some of the specific skills which go to make up power in one or both of the traits whose relationship one is attempting to measure. For these reasons, the validity of these partial correlation coefficients as true measures of the relationships under discussion may be questioned. In spite of these overlappings of one trait on another, it is probably safe to assume that these partial correlation coefficients express something which is significant relative to the relationships which exist among the traits in question.

The writer has tentatively accepted three interpretations of the coefficients in Table IV:

1. Between general reading ability, as measured by such tests as the Stanford Reading Tests and the Thorndike-McCall Reading Scales, and arithmetic problem solving ability, as measured by such tests as the Stanford Arithmetic Tests and the (New) Stone Reasoning Tests, there is little, if any, significant relationship. The mean second order coefficient

between reading and arithmetic problem solving with arithmetic fundamentals and intelligence held constant ($r_{13.24}$) is .25. The coefficient of .30 in the Lincoln School represents the most significant relationship found in any of these schools between the two traits. In the Florida State schools, the low coefficient of .17 indicates that although the relationship is positive it is not significant. Problem solving in arithmetic apparently involves a different type of reading skills from those stressed in the tests used in this study to measure general reading ability. Various other studies add emphasis to this conclusion. The studies of Terry[2] and Wilson[3], for example, point out the need for special attention to the development of definite problem reading skills.

2. The mean of the second order coefficients between arithmetic problem solving and intelligence is .216. The lack of significance in the residual relationship between these two traits is rather startling. It has been assumed quite generally that ability in arithmetic problem solving is closely related to the power to reason. There is need for extensive experimental evidence on several phases of this relationship. Such problems as the following need investigation. Are pupils quite generally solving arithmetic problems by resorting to the application of type habits? Do the problems of the type commonly used in tests of problem solving ability, and in many school textbooks in arithmetic, stimulate reflective thinking and reasoning? May not the solution of abstract arithmetic problems be largely a test of memory combined with trial and error responses? The evidence seems to point to a need for the use of very concrete arithmetic problems which relate to the immediate experiences and personal interests of the pupils, if higher intellectual responses are to be secured in the solution of reasoning problems.

3. The mean of the second order coefficients between arithmetic fundamentals and arithmetic problem solving is .492. This indicates a reasonably high residual relationship between the two traits. The relationship between scores in arithmetic fundamentals and scores in arithmetic problem solving is closer than that between any other pair of traits studied. It is not safe, however, to infer that there is any significant causal relationship between these two traits. Experimental evidence, in fact, seems to indicate that there is little, if any, transfer from numerical accuracy

[2] Terry, P. W. *How Numerals Are Read:* An Experimental Study of the Reading of Isolated Numerals and Numerals in Arithmetic Problems. Chicago: Department of Education, University of Chicago, 1922.

[3] Wilson, Estaline. "Improving the Ability to Read Arithmetic Problems," *Elementary School Journal,* XXII (Jan., 1922), pp. 380-86.

to arithmetic reasoning.[4] The relatively high relationship found here between ability in arithmetic fundamentals and ability in arithmetic problem solving is probably due in large part to the fact that, irrespective of reasoning power, those who are accurate in calculation solve a greater number of problems correctly than do those who are inaccurate.

During the course of the investigation the question arose as to whether or not there was any noticeable change or trend in the relationships among these four traits as pupils progress from grade to grade. To measure the influence of increasing maturity on these relationships, the zero, first, and second order coefficients of correlations were found for the pupils in each of the four grades studied in Public School No. 157, New York City. The second order coefficients obtained in this supplementary study are, as was to be expected, smaller than those obtained when all four grades were included as one group, but no orderly improvement or loss of relationship was to be observed as the scores tabulated came from higher grades. The partial correlation coefficient $r_{12.34}$, for example, was .16, .28, .14, and .22 in grades three, four, five, and six, respectively; and in the same grades the coefficient $r_{13.24}$ was .46, .30, .22, and .25, respectively.

Another question raised by this study was whether or not the Stevenson Arithmetic Reading (Problem Analysis) Test measures a type of reading which is more closely related to problem solving than is the Stanford Reading Test. The Stevenson Arithmetic Reading Test was therefore administered to 123 pupils who had taken the other four tests in the fifth and sixth grades of Public School No. 157 in New York City. The zero order coefficients found among these 123 pupils are given by Table V.

For the fifth and sixth grade pupils in Public School No. 157, the correlation of the Stanford Arithmetic Reasoning Test with the Stevenson Arithmetic Reading Test (r_{35}) was .42, while the same reasoning test had

TABLE V

ZERO ORDER COEFFICIENTS AND THEIR PROBABLE ERRORS (GRADES 5 AND 6)

$r_{12} = .29 \pm .06$	$r_{13} = .23 \pm .06$	$r_{14} = .37 \pm .05$	$r_{15} = .48 \pm .05$
	$r_{23} = .35 \pm .05$	$r_{24} = .22 \pm .06$	$r_{25} = .37 \pm .06$
		$r_{34} = .19 \pm .06$	$r_{35} = .42 \pm .05$
			$r_{45} = .30 \pm .06$

Variables 1—Reading 2—Fundamentals 3—Reasoning 4—"Intelligence" 5—Problem Analysis

[4] Winch, W. H. "Accuracy in School Children: Does Improvement in Numerical Accuracy Transfer?" *Journal of Educational Psychology*, I (Dec., 1910), pp. 557-89.
Winch, W. H. "Further Work on Numerical Accuracy in School Children: Does Improvement in Numerical Accuracy Transfer?" *Journal of Educational Psychology*, II (May, 1911), pp. 262-71.

a correlation of only .23 with the Stanford Reading Examination (r_{13}). The ability measured by the Stevenson Arithmetic Reading or Problem Analysis Test is apparently more closely related to arithmetic reasoning ability than is the ability measured by the general reading examinations of the Stanford Achievement Test. The most interesting item revealed by Table V, however, is the large reduction in the sizes of the coefficients as compared with those given in Table II, due in large measure to the narrower ranges of the scores found in the fifth and sixth grades as compared with those found in grades three to six.

As a matter of curiosity, first, second, and third order partial correlation coefficients were worked out from the data in Table V. The third order coefficients are listed in Table VI.

TABLE VI

THIRD ORDER COEFFICIENTS OF (PARTIAL) CORRELATION (GRADES 5 AND 6)

$r_{12.345} = .10$	$r_{13.245} = .00$	$r_{14.235} = .26$	$r_{15.234} = .36$
	$r_{23.145} = .22$	$r_{24.135} = .08$	$r_{25.134} = .18$
		$r_{34.125} = .04$	$r_{35.124} = .30$
			$r_{45.123} = .11$

Variables 1—Reading, General 2—Fundamentals 3—Reasoning 4—"Intelligence" 5—Arithmetic Reading

The most interesting coefficient in Table VI is probably the second one listed in the table ($r_{13.245} = .00$), which suggests that when scores in fundamental operations, in "intelligence," and in arithmetic reading have been equalized, there is no residual relationship between general reading ability and ability in solving reasoning problems in arithmetic. On the other hand, the next-to-last coefficient ($r_{35.124} = .30$) indicates that there is a small residual relationship between arithmetic reasoning ability and arithmetic reading ability, even after general reading ability, power in the fundamental operations, and "intelligence" scores have been rendered constant.

For the sake of completeness it should probably be said that the fifth and sixth grade pupils of Public School No. 157 had been given no special training in reading arithmetic problems other than that which was incidental to arithmetic problem solving. It is uncertain, however, whether special training in reading arithmetic problems would have changed the correlations. Washburne and Osborne, in a carefully controlled experiment, found that special training in problem analysis helped some of the

slower pupils, but that it did not result in higher accomplishments for the class as a whole.[5] There is evident need for further studies in this field.

SUMMARY

Examination of the correlations existing among tests of general reading ability, arithmetic reading ability, "intelligence," arithmetic problem solving ability, and ability in the fundamental operations of arithmetic, seems to show that ability in fundamental operations is more closely correlated with ability in problem solving than is general reading ability. Tests of problem reading (or problem analysis) seem to have higher correlations with tests of problem solving than do tests of general reading or of fundamental operations, although certain studies seem to indicate that special training in problem analysis does not result in higher achievements for normal pupils in problem solving. The suggestion which constantly arises from such studies as this is that a large proportion of our pupils may be solving reasoning problems in arithmetic by means of type solutions rather than by means of vital reasoning processes. It is clear, at least, that further experiments are needed before we can safely say that the teaching of problem solving in arithmetic rests upon a sound scientific basis.

[5] Washburne, C. W., and Osborne, Raymond. "Solving Arithmetic Problems," *The Elementary School Journal*, XXVII, Nos. 3 and 4 (Nov. and Dec., 1926), pp. 219-226; 296-304.

A FURTHER STUDY IN INDIVIDUAL INSTRUCTION[1]

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THE results of a recent study of individual instruction in vocational agriculture indicate that the individual method is equal, if not superior, to the mass or group method. The data to justify the above conclusion were obtained from an experiment conducted during the school year 1929-30, in five public high schools in Northwest Arkansas. These findings are supported by data from a similar experiment conducted by the writer in the academic year 1927-28, in seven public schools located in Van Buren and Faulkner Counties, Arkansas.[2]

The purpose of the experiment described in this article was to determine whether the individual method of instruction in vocational agriculture may be used with the same efficiency as the group method. This experiment was occasioned by a growing tendency on the part of teacher trainers and supervisors of agricultural education to recommend the use of individual instruction in small classes where the number of pupils does not justify the full time of the teacher of vocational agriculture. The use of the individual method under these conditions enables the teacher to combine small classes and at the same time permit a wide spread in subject matter content, and in some instances, to devote considerably less time to the actual teaching of small classes.

The individual method of instruction is also being used in the larger rural consolidated centers where the experience and vocational needs of the pupils in a class in vocational agriculture embrace a number of farm enterprises in excess of what may be effectively offered in the course of study. The needs and aptitudes of these pupils may be met by the individual study of farm problems peculiar to the farm on which each pupil resides.

Seventy-six pupils in five schools were selected for the experiment. This selection constituted the total enrollment of ninth and tenth grade pupils in the first year of vocational agriculture in the five schools. These pupils, with but few exceptions, were all farm boys, and at the time of the experiment, were engaged in the production of some agricultural enterprise. The five schools were selected because of their similarity

[1] Research paper No. 169, Journal Series, University of Arkansas.

[2] Roberts, Roy W. "Individual Instruction in Vocational Agriculture." *Journal of Educational Research*, XIX (May 1929), pp. 349-352.

with reference to facilities for instruction and teacher qualifications. Each school possessed adequate laboratory equipment and each teacher had approximately the same professional training and experience.

The subject matter content used in the experiment was based on the study of two blocks of work consisting of the enterprises of corn production and milk production. These two blocks constituted approximately one-third of the course content of each course in vocational agriculture in each of the five schools. The scope of the experiment was limited to these two enterprises because they were the only ones common to the five courses of study. The use of *Job Sheets for Pupils in Vocational Agriculture*[3] made it possible to have uniformity in the subject matter content of each teaching unit in each school. These job sheets did not contain subject matter within themselves, but they served as a guide to the pupil and the teacher in the selection and study from books and bulletin references of subject matter and laboratory exercises pertinent to the enterprises of corn production and milk production.

The seventy-six pupils in the experiment were grouped into five classes, one class in each school. Two of the classes, designated as Section I, pursued the study of corn production by the individual method and milk production by the group method of instruction. The remaining three classes, designated as Section II, reversed the above order of study and pursued the study of corn production by the group method and milk production by the individual method.

The teachers were trained in the technique of individual instruction by means of personal conferences and written directions. A course calendar was provided each teacher, indicating the month and the number of class periods suggested for the study of each job. This course calendar made it possible to keep constant the maximum time spent in the study of each unit. Each pupil was encouraged to progress as rapidly as his ability permitted, but was instructed not to spend more than the suggested time allotted to any one job. Adequate directions for pupil activity were indicated on the job sheets. The job test was administered by the teacher at the completion of the study of each unit, and the pupil was permitted to proceed to another job. Short group discussions not to exceed fifteen minutes each were held from time to time for the discussion of questions and problems of common interest.

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[3] Holloway, Keith L., and Roberts, Roy W. *Job Sheets for Pupils in Vocational Agriculture.* Fayetteville, Arkansas: The Vocational Publishing Company, 1929.

The mass or group method of instruction consisted of the usual group exercises in supervised study, class recitation, and laboratory activities commonly employed in classes in vocational agriculture. The teacher was instructed to follow the course calendar referred to above and the same job tests were administered to the group at the completion of the study of each farm job.

Table I indicates the character and extent of the testing program used in the experiment for the purpose of matching pupils and securing comparable data.

TABLE I

THE NAME OF THE TEST, TIME GIVEN, AND THE PURPOSE OF THE TESTS ADMINISTERED IN THE EXPERIMENT

Name of Test	Time Given	Purpose
Terman Group Test of Mental Ability, Form A	At the beginning of the experiment	For matching the pupils in each group
Agricultural Information Test	At the beginning of the experiment	For matching the pupils in each group
Seven Job Tests on Corn Production	At the completion of the study of each job in the corn production series	To determine the proficiency each individual acquired in the study of each job
Five Job Tests on Milk Production	At the completion of the study of each job in the milk production series	

The Terman Test, as indicated in Table I, was administered to all the pupils in each class at the beginning of the experiment. The test scores were used in matching the pupils from the two groups on the basis of intelligence. The agricultural information test consisted of true and false, selective answer, and completion statements relating to agricultural subject matter. It was designed and used by the author in the matching of pupils from the two sections on the basis of subject matter information in agriculture they possessed at the beginning of the experiment. The reliability of this test determined by the chance half method was found to be .75 ± .03. The job tests were objective measures designed by the author for testing the proficiency acquired by each pupil on each job. There were seven job tests in the corn production enterprise and five in the milk production enterprise. The total score of the job tests on one series constituted the enterprise score for that particular series. These job tests, as indicated, were administered at the completion of the study of each job. The reliability of the series of tests on corn production was found to be .80 ± .02. The reliability of the milk production series was found to be .76 ± .03.

The correlations between the series of final measures and the tests used in matching pupils in the experiment are indicated in Table II.

TABLE II

CORRELATIONS BETWEEN THE JOB TESTS ON CORN PRODUCTION AND MILK PRODUCTION AND THE TERMAN GROUP TEST AND AGRICULTURAL INFORMATION TEST

Initial Measure	Correlation with Corn Production Series	Correlation with Milk Production Series
Terman Group Test of Mental Ability Form A	.44 ± .06	.49 ± .05
Agricultural Information Test	.42 ± .06	.21 ± .07

Correlations of .44 ± .06 and .49 ± .05 were found between the final measures and the Terman Test. The correlations between the final measures and the agricultural information test were .42 ± .06 and .21 ± .07. These correlations were considered adequate to warrant the use of the Terman Group Test of Mental Ability and the agricultural information test for matching purposes.

Fifty-six pupils, twenty-eight from each section, were selected for matching purposes to compare the efficiency of the two methods of instruction. This selection was on the basis of individual scores made by the pupils on the initial tests. Individual scores made by pupils in Section I were matched with those made by pupils in Section II and an attempt was made to match pupils in each section who possessed approximately the same mental ability and extent of agricultural information at the beginning of the experiment. This procedure was for the purpose of establishing two approximately identical sections, as indicated by the average scores for each section on the initial tests, to serve as a basis for comparing the average scores made by these sections on each of the final measures.

Table III indicates the average scores of pupils in each section on the Terman Group Test of Mental Ability and the agricultural information test.

TABLE III

AVERAGE SCORES OF PUPILS IN THE TWO SECTIONS ON THE TERMAN GROUP TEST OF MENTAL ABILITY AND THE AGRICULTURAL INFORMATION TEST

Initial Test	Section I (Individual-Corn) (Group-Milk)	Section II (Individual-Milk) (Group-Corn)
Terman Group Test of Mental Ability Form A	96.7	97.3
Agricultural Information Test	27.7	28.4

An average Terman score of 96.7 was made by pupils in Section I. The average Terman score for the pupils in Section II was 97.3. The scores made by pupils in Sections I and II on the agricultural information test were 27.7 and 28.4, respectively. The average scores on these two initial tests made by pupils in the two sections were considered suffi-

ciently close to warrant the conclusion that the sections were approximately equally matched.

The final step in the analysis of the data from the experiment consisted of a comparison of the progress made by each section in both the individual and the group method of instruction. This was accomplished by first comparing the average score made by pupils who studied corn production by the individual method (the pupils in Section I) with the average score made by the pupils who followed the study of corn production by the group method (the pupils in Section II). The average score on milk production made by pupils in Section II, the individual instruction section, was then compared with the average score on milk production made by pupils in Section I, the group instruction section.

An analysis of the comparative data on the two enterprises for both the group and the individual methods of instruction is indicated in Table IV.

TABLE IV

AVERAGE SCORES OF PUPILS IN THE TWO SECTIONS ON THE JOB TESTS ON CORN PRODUCTION AND THE JOB TESTS ON MILK PRODUCTION

Final Test	Section I (Individual-Corn) (Group-Milk)	Section II (Individual-Milk) (Group-Corn)	Difference	P.E. diff.	Diff. / P.E. diff.
Corn	70.3	63.8	6.5	1.76	3.69
Milk	49.8	48.8	1.0	1.30	0.77

The average score on corn production made by the pupils who followed the individual method of instruction, exceeded by 6.5 the average score made by pupils on this same enterprise who followed the group method of instruction. The reliability of the difference is indicated in the table in terms of its probable error. The difference divided by its probable error is 3.69, which indicates that the chances are 99 in 100 that the difference is significant.

The average score on milk production made by the pupils of the group instruction section exceeds the average of the pupils in the individual instruction group by 1.0. This difference divided by its probable error is 0.77, the chances for a true difference greater than zero being 70 in 100.

CONCLUSIONS

The difference between the scores made by the pupils in the study of corn production, which comprised one-half the experiment, indicates that the individual method of instruction is superior to the group method to the extent of 99 chances in 100. The data for the study of milk pro-

duction show a superiority in favor of group instruction to the extent of 70 chances in 100. The differences do not warrant a general conclusion that either method of instruction will prove superior in every instance. These data do show, however, that the method of individual instruction is equally as efficient as the group instruction method, with a tendency in favor of individual instruction. This tendency is indicated by the significant findings in the data on the study of corn production as compared to the lack of significance in the findings of the data on the study of milk production. These facts would seem to justify the use of individual instruction in combined classes and in large classes where the experience and needs of the class group require an enriched course of study in vocational agriculture.

CASUAL LEARNING OF WORD MEANINGS*

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THE fact that learners of various ages acquire certain abilities and knowledges without the help of the ordinary agencies of education is generally accepted. This phenomenon has received more or less discussion in general psychological literature, being commonly referred to as "observational learning." This term has usually meant the process of acquiring some knowledge or skill without deliberate effort or even, in some cases, without much consciousness on the part of the learner. The language, for example, which an individual develops as a result of having been born into one type of social setting is due to this form of learning. Many of the mannerisms connected with an individual's speaking, gesturing, walking, and even thinking, probably have the same origin.

That the school accepts the theory of casual learning can be illustrated by numerous procedures which are carried on. Efforts are made, for example, to surround the child with objects which will provide him with aesthetic stimulations, such as pictures, and pieces of statuary. It is assumed that in this way his developing tastes will be turned, almost unconsciously, in desirable directions. It is supposed that the formation of health habits can be subtly influenced by the display of posters of pleasing design, indicating the value of milk and apples, the need of brushing the teeth, or the desirability of opening the windows at night. Most school administrators exercise care in the selection of teachers who will serve as examples to the children in matters of speech, manners, and general conduct. Since the belief in the potency of casual learning appears to be rather widespread, any objective appraisal of its amount and character would seem to be important. The present study is an attempt to throw light on one narrow phase of the problem.

METHOD AND SUBJECTS

Problems of method.—The first step in setting up a study of casual learning is to select an ability which can be measured in advance of stimulation. The determination of the degree of knowledge or skill already possessed by the individual in the ability to be studied is clearly fundamental.

* The writer is under obligation to Dr. Emma Reinhardt of the Eastern Illinois State Teachers College for coöperation in obtaining part of the data used in this study.

In the second place, the learning situation must be presented as "casual," and not as a type of experience which the individual believes he is under some obligation to put forth effort to acquire.

In the third place, the learning situation must be of such nature that its results can be objectively measured at the end of the period of stimulation and an analysis made of the nature of the changes which have come about. This means that the experimenter must be able to anticipate the possible outcomes of the learning and must devise some type of objective scheme for checking them.

Form of casual learning studied.—The form of learning used in this study was the acquiring of the meaning of new words by casual contact with them. This rather narrow activity was selected because it offered the possibility of applying the criteria just referred to for this type of study. It is open to testing before and after stimulation; it can be carried on casually; and it is of such nature that it can be rather completely analyzed.

Subjects.—The learners used in the study were two groups of college students, hereinafter referred to as Group A and Group B. Group A consisted of several classes of summer-school students who were enrolled in a state teachers college. The classes which were in charge of the writer were used as experimental sections. Several classes in charge of other instructors were used as control sections. The majority of the members of Group A were men and women with teaching experience, either in the elementary school or the high school. A small number of the group were students of less maturity.

Group B consisted of several classes of freshman and sophomore students who were enrolled in a state teachers college during the regular year. One instructor was in charge of the experimental sections, while several instructors were in charge of the control sections.

In general, the two groups of students, A and B, were subjected to the same experimental procedure. There were a few variations in the technique applied to the two groups. These will be commented on later. The results for the two groups will be presented in separate tables.

Tests used.—Three tests were given to all students in both the experimental and control sections: (1) a 20-word vocabulary test, prior to the period of learning, (2) the same test, after the period of learning, and (3) a group intelligence test. The vocabulary test, of the multiple-choice type, was made up of difficult words selected from the upper levels of the Thorndike CAVD examination.

Group A was given the Otis Group Intelligence Scale, Advanced Examination. Group B was given the Otis Self-Administering Test of Mental Ability, Higher Examination, with a 30-minute time limit.

Casual learning procedure.—The material for the learning part of the study consisted of a simple definition with an illustrative sentence for each of the twenty words in the vocabulary test.

Each day, before the experimental class entered the room, one of the words with its definition and illustrative sentence was written on the board. The word was underlined in the definition and also in the illustrative sentence. The definition with its illustration was left on the board during the five minute interval while the class was assembling. As soon as the signal for the beginning of the period was heard, the definition and illustration were erased and the regular work of the class taken up. This procedure meant that the word could be observed from a maximum of somewhat less than five minutes down to almost no time, depending on when the student got to class.

No explanation was given the class as to the purpose of the definitions. A few students asked the reason for their appearance and were merely told that the words had nothing to do with the regular class work.

This procedure was continued until each of the twenty words had been presented. On the day following the presentation of the last definition, the vocabulary test was repeated.

In the case of Group A the class met twice a day, morning and afternoon. Two words were thus presented each day, one at each period. A total of twenty-one days elapsed between the presentation of the first word to this group and the final test. Group B met only once a day and a total of thirty-nine days elapsed between the presentation of the first word and the final test.

The score on the two vocabulary tests was determined by the number of correct responses, no account being taken of the factor of guessing. Since this factor would be equally strong in the experimental and control sections, it was assumed that it would neutralize itself.

Determination of experimental and control sections.—After the completion of the final vocabulary test, the experimental and control sections were made up. Each individual experimental case was matched with a control case on the basis of the initial vocabulary test score. This method produced 44 pairs of individuals in Group A and 49 pairs in Group B. No effort was made to pair in terms of sex.

The intelligence test scores were used to make a general correction of the final differences on the vocabulary tests but were not used directly in the pairing.

ANALYSIS OF THE DATA

Vocabulary test results for Group A.—Table I shows the results of the vocabulary tests for the experimental and control sections of Group A. The initial means and the initial S.D.'s are substantially equal, due to the method of pairing which was used. The final means and final

TABLE I

COMPARISON OF THE VOCABULARY TEST RESULTS FOR THE TWO SECTIONS OF GROUP A

	Measure			
	Mean		S.D.	
Group	Initial	Final	Initial	Final
Experimental	6.82 ± .45	13.36 ± .64	2.98	4.25
Control	6.70 ± .46	7.86 ± .56	3.02	3.70
Difference		5.50 ± .54		

S.D.'s show differences which reflect the influence of the learning situation in which the experimental section was placed.

Standard errors were computed for each of the four means and for the difference between the final means. The long formula was used for the standard error of the difference. (The r for final scores of the experimental and control groups is .60 ± .07). The four means and the difference between the final means are all statistically reliable, being more than four times their standard errors.

The important datum in Table I is, of course, the difference between the final means for the experimental and control sections. The experimental section which was exposed to the casual learning situation acquired the meaning of 5.50 more words than did the control section.

Vocabulary test results for Group B.—Table II shows the results of the vocabulary tests for Group B. This table is made up in exactly the same way as Table I and the data presented in it are to be similarly interpreted.

TABLE II

COMPARISON OF THE VOCABULARY TEST RESULTS FOR THE TWO SECTIONS OF GROUP B

	Measure			
	Mean		S.D.	
Section	Initial	Final	Initial	Final
Experimental	5.57 ± .40	11.18 ± .60	2.94	4.30
Control	5.69 ± .40	6.22 ± .40	2.83	2.79
Difference		4.96 ± .65		

Standard errors were computed for the four means and the difference between the final means. The long formula was again used for the standard error of the difference. (The r for the final scores of the experimental and control groups is .20 ± .06). The four means and the difference between the final means are all statistically reliable. The experimental section learned the meaning of 4.96 more words than did the control section.

Intelligence test results.—It might be argued that no account need be taken of the factor of general intelligence in a study using material of this type, since vocabulary ability is in fact one of the important components of the total mental make-up of an individual. On the other hand, a group of students might appear to advantage in a vocabulary test alone, due to special training, but might not do so well in a more comprehensive examination.

In order to deal with this problem mean scores and S.D.'s on the intelligence test were prepared for the experimental and control sections. These are shown in Table III for Group A and in Table IV for Group B. It will be seen that in both tables the experimental section

TABLE III

COMPARISON OF THE INTELLIGENCE TEST RESULTS FOR THE TWO SECTIONS OF GROUP A

Section	Measure: Mean	S.D.
Experimental	126.93 ± 2.23	14.80
Control	118.30 ± 2.51	16.70
Difference	8.63 ± 3.36	

TABLE IV

COMPARISON OF THE INTELLIGENCE TEST RESULTS FOR THE TWO SECTIONS OF GROUP B

Section	Measure: Mean	S.D.
Experimental	109.20 ± 1.33	9.25
Control	104.90 ± 1.39	9.70
Difference	4.30 ± 1.92	

made a higher mean score than the control section. There is a difference of 8.63 with a standard error of 3.36 for Group A and a difference of 4.30 with a standard error of 1.92 for Group B. Both differences are moderately reliable, being at least twice their standard errors.

Importance of the intelligence factor.—Are these differences in mental ability large enough to account for the differences in the means for the final vocabulary tests? If, for example, the mean of the experimental section of Group A on the intelligence test were 118.30, that of the control section, would there still be a difference of 5.50 in the means for the final vocabulary test?

In order to answer these questions the following regression equation formula was made use of: $x = r.\frac{S.D.x}{S.D.y}.y$. In this formula x and y are the probable deviations from the means of the two sets of scores, in this case those on the final vocabulary test and the intelligence test for the experimental section.

The r for the final vocabulary test scores and the intelligence test scores for the experimental section of Group A was computed and found to be .56 ± .07. The S.D.x for this section is found in Table I to be 4.25; the S.D.y is found in Table III to be 14.8. When these values are substituted in the above formula the result is x = .16y. This last equation means that when the x variation, that of the vocabulary test mean, equals one unit, the y variation, that of the intelligence test mean, equals .16 of a unit. In order that the intelligence test mean of the experimental section be equal to that of the control section, it would have to be reduced 8.63 points (the difference between the intelligence test means for the two sections shown in Table III) or have a variation of –8.63. If this value is substituted for y, the last equation becomes: x = –1.38. This indicates that the mean of the final vocabulary test for the experimental section of Group A would be reduced 1.38 points or become 11.92. (This estimate, 11.92, has a standard error of ± 3.5). In other words after the intelligence test means are equalized, there still remains a difference of 4.06 words (11.92 minus 7.86) in favor of the experimental section.

The r between the final vocabulary test scores and the intelligence test scores for the experimental section of Group B was computed and found to be .40 ± .08. The S.D.x of this section is found from Table II to be 4.30; the S.D.y is found from Table IV to be 9.25. Substituting these values in the regression equation formula gives: x = .19y. The value for y is –4.30 (the difference between the intelligence test means in Table IV). Substituting this in the last equation gives: x = .82. This indicates that equalizing the intelligence test means of the experimental and control sections of Group B reduces the final vocabulary test mean of the experimental section, 11.18, by .82 of a word or makes it 10.36. (This estimate, 10.36, has a standard error of 4.0). This still leaves an advantage of 4.14 words (10.36 minus 6.22) for the experimental section.

Summarizing the above discussion, it may be said that even if the experimental and control sections of each of the two groups had exactly the same means on an intelligence test, the casual learning situation would still produce an advantage of more than four words.

Detailed character of the learning.—In order to discover the differences underlying the scores made by the experimental and control sections on the vocabulary test, a word by word comparison was made for each individual on the basis of the initial and final test results. The two tests for each individual were placed side by side. One of four symbols was placed in front of each word on the final test paper: a plus sign if the word was wrong on the initial test but correct on the final; a minus sign, if the word was correct on the initial test but wrong on the final; a zero, if the word was correct on both tests; a zero with a horizontal line through it, if the word was incorrect on both tests. The number of words which fell into each of these four classes was then recorded on the bottom of the final test paper for each individual.

With these data as a basis it was possible to find the average number of words on which each group of students improved, the average number on which there was retrogression, the average number on which both responses were correct, the average number on which both were incorrect. The means, standard deviations, and percentages for these changes are presented in Tables V and VI. Table V shows that the experimental section made a mean improvement of 7.18 words from the initial to the final test, the control section an improvement of 2.86 words, the experimental section improved on 35.9 percent of the words in the test, the control section on 14.3 percent, the standard deviation of the experimental section was 2.85 words, and the standard deviation of the control section 1.95 words. Table VI is to be similarly interpreted for Group B.

TABLE V

MEAN NUMBERS, PERCENTS, AND S.D.'S OF WORDS SHOWING VARIOUS CHANGES FOR GROUP A

	Mean		Percent		S.D.	
Change	Exp.	Con.	Exp.	Con.	Exp.	Con.
Improvement	7.18 ± .44	2.86 ± .29	35.9	14.3	2.85	1.95
Retrogression	.66 ± .12	1.73 ± .19	3.3	8.7	.8	1.27
Both correct	6.18 ± .47	5.0 ± .51	30.9	25.0	3.11	3.37
Both incorrect	5.98 ± .6	10.41 ± .51	29.9	52.1	4.02	3.4

TABLE VI

MEAN NUMBERS, PERCENTS, AND S.D.'S OF WORDS SHOWING VARIOUS CHANGES FOR GROUP B

	Mean		Percent		S.D.	
Change	Exp.	Con.	Exp.	Con.	Exp.	Con.
Improvement	6.32 ± .51	2.12 ± .23	31.6	10.6	3.54	1.59
Retrogression	.72 ± .12	1.57 ± .17	3.6	7.9	.81	1.16
Both correct	4.86 ± .38	4.1 ± .4	24.3	20.5	2.69	2.82
Both incorrect	8.1 ± .58	12.2 ± .39	40.5	61.0	4.07	2.74

A number of characteristics of the learning which took place between the initial and the final vocabulary test can be seen from a detailed examination of Tables V and VI. It will be noticed that in both tables the advantage of the experimental sections over the control sections consists not only in more improvement but in less retrogression. Thus in Table V the experimental section improved on 7.18 words or 35.9 percent of the twenty words in the test, while the control section improved on 2.86 words or 14.3 percent of the words in the test. Again the experimental section in Table V retrogressed on .66 words or 3.3 percent of the words as compared with 1.73 or 8.7 percent of the words for the control section. A similar result is seen in Table VI for Group B. Summarizing, it may be said that the learning experience which the experimental sections were subjected to had two effects: (1) it gave them a correct understanding of a certain number of words which they did not have at the beginning of the study, (2) it reinforced their understanding of other words, thus preventing retrogression.

It will be seen in both Tables V and VI that the "both correct" averages for the experimental and control groups are very similar. This results, of course, in large part from the method of pairing. It will be noticed too that the sum of "both correct" and "improvement" in the case of each group equals the average for the final test as given in Tables I and II. Thus the score on the final test represents a very large percentage of knowledge which the student had, or at least could make a correct score on, at the time of the initial test.

The final classification in Tables V and VI, "both incorrect"—indicates in another way the character of the learning which took place. The experimental sections show fewer words on which the response was wrong on both the initial and final tests. In fact the differences between the means for the experimental and control sections on the "both incorrect" category is another way of stating the results of the casual learning.

The time factor in casual learning.—A record was made of the date on which each definition was presented to the experimental classes. The interval in days between this presentation and the administration of the final vocabulary test was thus known. The intervals were grouped into steps of five days each, 0-4, 5-9, etc. For each step there was then computed the percentage of each of the four change categories referred to above: improvement, retrogression, both correct, both incorrect. These data are shown in Table VII for the experimental section of Group A; in Table VIII for the experimental section of Group B. Table VII indi-

cates that words which were presented from 20 to 24 days preceding the final test showed improvement in 36.4 percent of the cases; retrogression in 3.8 percent of the cases; both correct in 22.7 percent of the cases; and both incorrect in 37.1 percent of the cases. Table VIII is to be similarly interpreted.

TABLE VII

PERCENTAGE OF EACH TYPE OF CHANGE MADE DURING EACH TIME INTERVAL BY GROUP A

Interval in days	Percentage of Change			
	Improvement	Retrogression	Both correct	Both incorrect
20-24	36.4	3.8	22.7	37.1
15-19	35.9	3.6	37.7	22.7
10-14	30.5	1.8	30.5	37.3
5-9	37.1	3.0	15.9	43.9
0-4	42.0	4.5	35.6	18.8

The percentages in Table VII for improvement show a slight tendency to decline from the longer intervals, 20-24 and 15-19, to the median interval, 10-14, and to increase at the smaller intervals, 5-9 and 0-4. At the same time, the percentages for the opposite change, retrogression, show a tendency to take the same course. Thus, apparently, for certain words a long interval of time or a short one may produce improvement on a final test; while for other words, a long interval of time or a short one may produce retrogression. The percentages in the third and fourth columns of Table VII show no consistent relation to the length of the time interval. A word which had an interval of 15-19 days is as likely to be correct on both tests as one which had an interval of 0-4 days. A word which had an interval of 20-24 days is as likely to be incorrect on both tests as one which had an interval of 10-14.

It will be remembered that the presentation of the words to the experimental section in Group B covered a total of 39 days. The percentages of changes for this group are shown in Table VIII. The effect of

TABLE VIII

PERCENTAGE OF EACH TYPE OF CHANGE MADE DURING EACH TIME INTERVAL BY GROUP B

Interval in days	Percentage of Change			
	Improvement	Retrogression	Both correct	Both incorrect
35-39	46.9	3.1	20.4	29.6
30-34	22.4	6.1	52.0	19.4
25-29	36.1	4.2	46.2	13.4
20-24	35.3	4.1	36.1	24.5
15-19	22.4	1.4	40.1	36.1
10-14	26.7	1.4	38.7	33.1
5-9	24.3	4.9	58.3	12.6
0-4	40.5	4.8	34.1	20.6

the time interval is even less consistent for this group than was the case for Group A. The largest percentages for improvement in Table VIII are for the longest and the shortest time intervals, 35-39 days and 0-4 days. The percentages for the intervals between the two extremes show no clear trend. As was the case in Table VII, the larger percentages in the retrogression column of Table VIII are related in general to the longest and the shortest intervals. The last two columns in Table VIII are entirely without consistent relation between percentages and length of time intervals.

The general lack of relation between length of time interval and change in response to the two vocabulary tests is probably due, in part at least, to two causes: first, differences in the difficulty of the words themselves; second, a group of chance factors centering in the students' observation of the definitions. While all of the 20 words would be classed as difficult, they varied somewhat in this quality. They were presented in the learning situation in random order of difficulty. This procedure may have nullified, in part, the effect which differences in time interval might have exerted.

It is likely that there was little consistency in the amount of attention which the student gave to the definitions as they appeared on the board from day to day. This would be true for a number of reasons. Often the student would need to devote himself, during the five minute period, to further preparation of the assigned work for the day, or to discussing more urgent problems with friends. Again, there would be considerable variation from day to day in the length of time between the student's arrival in class and the beginning of the regular work. It is possible that on certain days he might have almost the entire five minute period to devote to various types of "casual" learning, while on other days he might have almost no time.

Summary

1. A total of 93 pairs of adults were used as subjects in a study of casual learning.

2. The learning situation consisted of the presentation, casually, of a list of difficult words with their definitions.

3. The experimental sections showed a significant improvement over the control sections in knowledge of word meanings. It seems possible to improve the vocabulary of a group of adults by merely exposing them for a few minutes each day to a new word.

4. The factor of difference in general intelligence between the experimental and control sections was taken into account. The learning advantage in favor of the experimental sections remained.

5. The gains of the experimental sections over the control sections consisted both in more improvement and less retrogression during the period of learning.

6. The length of the time interval between the learning situation and the final testing was not significantly related to the percentage of improvement or retrogression shown by the experimental sections.

THE RELATIVE VALIDITY OF THREE MEASURES OF STUDENT ACHIEVEMENT

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It is the custom in most schools to base the final grade in a course upon several measures of accomplishment. Examinations, daily grades, periodical tests, short quizzes, notebooks, home-work, book reports and themes are among the more common measures used. Most teachers have very decided views upon the relative merit of these various measuring devices, but few scientific attempts to evaluate them have been made.

Assuming that the primary function of grades is to measure achievement and further assuming achievement to be a complex condition, then the justification for the use of different measures depends upon the extent to which they measure different aspects of this complex, and it should be possible to determine the relative value as measuring devices of the various measures. The extent to which a particular measure agreed with some 'best' measure of achievement and at the same time did not agree too closely with other measures should be an indication of its validity.

It is the purpose of this paper to report an attempt to determine in this manner the relative validity of the three common measures of achievement, daily grades, monthly test grades, and final examination grades. Perhaps the best criterion with which to compare each of the measures would be standardized tests in the various subjects, but for this study this was impossible, consequently the average of the three grades was used as a criterion with which to compare each. Assuming this composite grade to be the most valid measure available, and, further, assuming high agreement with the composite but relatively low agreement with the separate measures to be the desideratum; by means of the correlation technique the three measures were evaluated.

The data upon which the study is based were the first semester grades for the school year 1930-31 given by the fifteen teachers in the Tuscaloosa Senior High School, Tuscaloosa, Alabama. Only final grades are ordinarily reported in this high school; but this final grade is determined from daily grades, monthly test grades, and final examination grades. During the first semester of the school year 1930-31 the teaching staff was asked to report, instead of the usual final grade, separate grades on each of these measures for each of their students. Such grades were reported for sixty-five classes with a total of 1362 records.

The daily grade, according to the teachers' reports, was a composite measure consisting of grades on notebooks, written work at the board or seat, themes and other homework, oral recitations, short objective quizzes, and estimates of the pupils' knowledge of the subject-matter. Not all of the above mentioned elements were used by all of the teachers, but they all reported some combination of several of them. The monthly tests were one-hour required tests. According to the teachers' reports most of them were objective. The final examinations were two-hour comprehensive examinations given at the completion of the semester's work. Practically every teacher reported the use of objective examinations or combined objective and essay examinations.

The general procedure used to evaluate the above described measures was to correlate each with the average of the three as a criterion, and then determine intercorrelations between the respective measures. The grading system used in this high school is a five-letter system with four passing letters. In determining the average of the three grades the letters were weighted as follows: A = 10, B = 7, C = 5, D = 3, F = 0. Such a weighting system assumes a normal distribution of grades, and the distribution of all the grades given in the school did give a fairly normal distribution. The correlation coefficients were calculated by means of the *Coefficient of Contingency*, the working form described by Holzinger being used.[1] It will be recalled that in a five-fold classification, such as is here used, a perfect correlation by this formula is represented as +.894 rather than +1.00.

Since the teacher's practical concern is with the validity of the measures as used in *classes*, the correlation between each measure and the criterion, and the intercorrelations, for each of the sixty-five classes included in the study was determined. The conclusions drawn here are based upon comparisons of the distributions of these coefficients for the different measures. Presumably, one might determine coefficients from larger groups, from all the grades of each teacher, from all the grades given in particular subjects or from the entire school system, and thus increase the reliability of the coefficients, and probably the size of the coefficients since the increased numbers would tend to increase the range; but actually such a procedure would not present a true picture of conditions as found in the classroom. We have, however, in addition to considering the total distributions of coefficients for the classes, considered

[1] Holzinger, Karl J., *Statistical Methods for Students in Education* (Boston: Ginn and Company, 1928), pp. 273-78.

the distributions of the coefficients for each teacher's classes and for the major subjects.

The distributions of the coefficients of contingency between the criterion and each of the three measures for the sixty-five classes are presented in Table I.

TABLE I

SHOWING THE DISTRIBUTIONS OF COEFFICIENTS OF CONTINGENCY BETWEEN CRITERION AND DAILY GRADES, TEST GRADES, AND EXAMINATION GRADES

	Frequency		
Interval	Daily	Test	Examination
.86 — .88	3	5	3
.83 — .85	9	13	12
.80 — .82	13	14	17
.77 — .79	14	6	11
.74 — .76	9	6	6
.71 — .73	3	8	4
.68 — .70	3	5	7
.65 — .67	3	6	2
.62 — .64	0	1	1
.59 — .61	1	1	1
.56 — .58	3		1
.53 — .55	2		
.50 — .52	1		
.47 — .49	0		
.44 — .46	1		
Number of Classes	65	65	65
Mean	.75 ± .01	.76 ± .01	.77 ± .01
Sigma	.09	.07	.07

Examination of this table indicates that the measures are all positively and rather highly correlated with the criterion, that each measure correlates with the criterion to about the same degree, and that there is a great amount of dispersion of the coefficients. Since each measure is included in the criterion, all of the coefficients represent to a certain extent the correlation of a variable with itself, and would therefore tend to run high. On the other hand, the unreliability of the measures, for which we were unable to correct, would tend to attenuate the coefficients; consequently it seems safe to assume that the measures are all getting at the same trait or traits. The probable error of the differences between the means is in each case ± .01, and the greatest difference found, between daily grades (.75) and examination grades (.77), is only twice the probable error. There is, then, no significant difference in the mean correlation of daily grades with the criterion, test grades with the criterion, and examination grades with the criterion.

The variability of the coefficients for the various classes is not to be taken too seriously. Not only was the number of students so small in many of the classes that the unreliability of the coefficients was great;

but, also, often the range of grades given was limited and the coefficients in these cases would be attenuated. The average number of students in each class was twenty, but in a few classes the number dropped below ten. In several classes there were no failures, and in a few classes no high grades. The range of the coefficients for daily grades with the criterion is slightly greater than that for either of the other two measures but the difference is slight. There seem to be no decided differences among the measures with reference to their relation to the criterion.

Not only should the measures definitely agree with the criterion, but there should be relatively low interrelations. Otherwise the measures may be assumed to measure the same aspect of achievement and it would be useless to base the final grade on more than one of them. The distributions of the coefficients for daily grades with test grades, for daily grades with examination grades, and for test grades with examination grades for the sixty-five classes are presented in Table II.

TABLE II

SHOWING THE DISTRIBUTIONS OF COEFFICIENTS OF CONTINGENCY BETWEEN DAILY GRADES AND TEST GRADES, DAILY GRADES AND EXAMINATION GRADES, AND TEST GRADES AND EXAMINATION GRADES

Interval	Frequency		
	Daily with Test	Daily with Examination	Test with Examination
.86 — .88			1
.83 — .85	6	3	3
.80 — .82	5	6	9
.77 — .79	9	11	8
.74 — .76	12	11	7
.71 — .73	5	8	9
.68 — .70	8	3	11
.65 — .67	5	3	3
.62 — .64	6	5	5
.59 — .61	1	3	6
.56 — .58	2	4	0
.53 — .55	1	2	0
.50 — .52	2	2	2
.47 — .49	0	1	0
.44 — .46	2	1	0
.41 — .43	1	1	1
.38 — .40		1	
Number of Classes	65	65	65
Mean Correlation	.71 ± .01	.71 ± .01	.71 ± .01
Sigma	.10	.11	.08

The mean coefficient found between a measure and each of the others is the same (.71) in every case. The dispersion is great, but no significant differences are noted among the measures. As compared with the correlations found between the criterion and the measures the interrelations seem high, but this is what one would expect since the criterion is made up by averaging but three items. Corrections for attenuation due to un-

reliability would make them still higher, but assuming approximately equal reliability for the three measures, the interpretation seems simple. On the basis of the interrelations, as on the basis of correlation with the criterion, the measures seem to have relatively the same value as measures of achievement.

Perhaps there are differences in the validity of the measures as used by particular teachers which our procedure of pooling all classes together has covered up. In order to investigate this possibility the mean of the coefficients between each measure and the criterion, with the range of these coefficients, was determined for the classes of each teacher, and are presented in Table III.

TABLE III

SHOWING MEAN AND RANGE OF COEFFICIENTS OF CONTINGENCY BETWEEN CRITERION AND DAILY GRADES, TEST GRADES, AND EXAMINATION GRADES FOR THE CLASSES OF EACH TEACHER

		Criterion with:					
		Daily Grades		Test Grades		Exam. Grades	
Teacher	N*	Mean	Range	Mean	Range	Mean	Range
1	6	.80	.74-.85	.77	.65-.84	.77	.71-.84
2	10	.81	.77-.86	.79	.71-.86	.80	.76-.84
3	10	.77	.65-.82	.75	.65-.84	.81	.76-.83
4	4	.55	.51-.61	.71	.67-.81	.71	.57-.81
5	5	.81	.78-.86	.82	.75-.85	.85	.83-.87
6	2	.60	.46-.75	.76	.71-.81	.80	.79-.81
7	3	.74	.70-.81	.77	.63-.86	.72	.64-.79
8	3	.65	.58-.70	.77	.70-.84	.77	.68-.80
9	3	.80	.74-.84	.82	.78-.84	.74	.70-.81
10	2	.82	.79-.85	.84	.83-.86	.80	.79-.82
11	3	.81	.78-.83	.82	.79-.86	.78	.73-.86
12	4	.66	.58-.73	.66	.61-.72	.68	.60-.78
13	5	.76	.72-.81	.74	.66-.81	.75	.69-.84
14	3	.79	.78-.81	.83	.81-.86	.83	.81-.85
15	2	.75	.74-.75	.80	.79-.81	.72	.66-.79
Total	65						
Mean		.75		.76		.77	
Sigma		.09		.07		.07	

* Number of classes reported.

We find here great variability from teacher to teacher but no consistent tendency for one measure to be superior to the others. For three teachers daily grade with the criterion yielded the highest mean coefficient, for five teachers test grade and criterion gave the highest mean coefficient, and examination grades with criterion was higher than the others for four teachers. In the case of only three teachers (Teachers 4, 6, 8) was there more than ten points between the highest and lowest mean correlation between a measure and the criterion. In the case of Teachers 6 and 8, where daily grades seem to be less valid than the other measures, the number of classes and the number of students in each class was so

small that the unreliability of the coefficients is certainly great. But as used by one teacher (Teacher 4) daily grades seem to be less valid than the other two measures. This teacher, a history teacher, had four rather large classes and her grades were distributed fairly normally. There may be facts which the writers were unable to find which make the measures have unequal value in the hands of this particular teacher, but in all probability it is a case of an extreme deviation due to the unreliability of either the teacher's or our own techniques.

Again, it may be that certain of the measures are more valid when used in measuring particular kinds of subject matter. Most teachers would say that they could determine the achievement of students in certain subjects better with one measure than with another. To furnish evidence upon this issue the coefficients of contingency for the various classes were distributed according to subjects. For the sake of convenience in doing this the subjects were grouped as follows:

English, including composition and Literature.
Foreign Language, including Latin, French, and Spanish.
History, including American history and World history.
Mathematics, including algebra, plane and solid geometry.
Science, including biology, chemistry and physics.
Home Economics, including foods and clothing.
Business, including bookkeeping and typewriting.

The means and the ranges of the coefficients between the criterion and daily grades, the criterion and test grades, and the criterion and examination grades for each of the subjects as grouped above are presented in Table IV.

TABLE IV

SHOWING MEAN AND RANGE OF COEFFICIENTS OF CONTINGENCY BETWEEN CRITERION AND DAILY GRADES, TEST GRADES, AND EXAMINATION GRADES FOR THE VARIOUS SUBJECTS

		Criterion with: Daily Grades		Test Grades		Exam. Grades	
Subjects	N*	Mean	Range	Mean	Range	Mean	Range
English	26	.79	.65-.86	.77	.65-.86	.79	.71-.84
Foreign Lan.	10	.75	.58-.86	.76	.61-.86	.76	.60-.87
Mathematics	9	.76	.72-.81	.77	.66-.86	.76	.66-.85
History	6	.63	.51-.79	.74	.67-.83	.75	.57-.83
Science	3	.79	.75-.85	.82	.79-.86	.80	.79-.82
Home Econ.	5	.69	.46-.81	.74	.63-.86	.75	.64-.81
Business	6	.73	.58-.84	.79	.70-.84	.73	.68-.81

* Number of classes reported.

In each of the subjects we find great variability for the different measures but there are no very noticeable differences in the relation between the criterion and the several measures. The mean coefficient between the criterion and the respective measures is within five points of being the same in English, in foreign language, in mathematics, and in science. In history and in home economies the daily grade seems to be least valid. In business the test grade appears to be superior to the other two measures. There is not enough evidence available to conclude that the findings with reference to these last three subjects represent consistent trends. There were three teachers with courses in history and with only one of them was the correlation of daily grades with the criterion relatively low. The classes in home economies were small and the daily grades relatively high, which narrowed the range and thus tended to lower the correlation. In business courses both the daily grades and the examination grades were negatively skewed which would again tend to lower this correlation. The safest conclusion seems to be that there are no significant differences in the validity of the three measures as used in the various subjects.

To summarize: (1) although there is great variability from class to class, the three measures, daily grades, test grades and examination grades, seem to be equally valid as measures of student accomplishment. (2) The same is true for the three measures as used by the various teachers with the possible exception of one teacher. (3) Although there is some variability from subject to subject, they are also probably equally valid as used in the different subjects.

The limited nature of the investigation causes one to hesitate in the making of general statements; but, if the use of the three measures in this school may be taken as typical of their use, the following implications seem to grow out of the findings:

(1) No elaborate system of weighting the measures which are combined to make up the final grade appears to be justified.

(2) Each measure should probably be weighted equal to the others. The validity of the more or less common practice of giving added weight to one or the other of the measures is not supported by the experimental evidence.

(3) Perhaps no measure could be dispensed with, for each seems to be measuring slightly different aspects of achievement. If we can assume that the average of the three grades is the best measure available then

the practice of exempting certain students from final examinations is probably reducing the validity of the measurement.

In conclusion we should again call attention to the fact that throughout this paper we have been considering these measures as instruments of measurement. Although the primary purpose of grades probably should be measurement they also have definite value as incentives to work and perhaps before finally deciding whether to use, or how to use, any proposed measure this motivating effect needs to be taken into consideration.

SHORTER ARTICLES

THE INFLUENCE OF HOME AND SCHOOL IN THE CHOICE OF A VOCATION

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THE choice of a vocation is without a doubt one of the most important decisions we are called upon to make. The vital importance of this decision is due to the fact that what we are depends largely upon what we do. Consequently, what we do should be the result of intensive study, intelligent choice, careful training, and continued self-improvement. It is the business of both the home and the school to provide effective vocational guidance for young people.

Little, if any, accurate information is available concerning the influence of the home and the school in choosing one's life career. Some very significant results, however, were obtained by giving questionnaires to 916 high-school students in three entirely different types of communities. Of the questionnaires, 619 were given to students in a high school which draws from two Chicago suburbs; 195 to students in a high school located in a Wisconsin town of 5000 inhabitants; and 102 to students in a rural high school in Wisconsin. None of these schools provides organized vocational guidance.

The questionnaire was divided into two parts. The first part included the following questions:

1. What is your father's vocation (profession or occupation)?
2. Have you considered the choice of work you would like to follow?
3. Would you be interested in a course which made a special study of different vocations?
4. Do you think such a course would help you decide the vocation you would like to follow?
5. Have you decided what vocation you will follow?

The students were directed to answer the rest of the questionnaire if question 5 was answered "yes." The second part of the questionnaire included the following:

1. Has your father's vocation been a factor in determining your choice?
2. Have any of your studies given you a suggestion which led to your special interests or choice?
3. Have the school activities which you have entered influenced your choice?

4. Has the present income of your family affected your choice? If so, in what way?
5. Has the income which you will receive in your chosen vocation affected your choice?
6. Do you have any knowledge of the training necessary before you are prepared to follow your chosen vocation?
7. Have you ever had after school or summer employment?
8. Did this employment affect your choice?
9. If possible give a brief statement which explains how you happened to choose the vocation which you expect to follow.

Interesting and significant results from the questionnaire follow (the numbers corresponding to the numbers of the questions):

2. Many high-school students do not begin early even to consider the choice of a vocation.

3. A large percentage of the students are anxious to know more about vocations. Even students who had already indicated their choice showed a desire to make a special study of vocations.

4. Naturally, those who were interested in a special study of vocations thought the course would be a help in making a choice of vocation.

5. A very large percentage of the seniors do not know what kind of work they will probably follow.

Answers to the second part of the questionnaire:

1. The father's vocation seemed to play a very small part, although there was some evidence of its influence. Even in the rural communities only a few expected to follow in their fathers' footsteps.

2. Courses of study as arranged in the three high schools investigated are not particularly helpful in making a choice of vocation. The girls derived more help than the boys from this source, explaining in many cases that the choice of vocation was "teaching."

3. School activities seemed to play an important part in seeking out special interests and abilities.

4. The income of the family had no significance, aside from the indication in a few cases that the choice of vocation was affected either because a college education could or could not be had.

5. The income which the chosen occupations afforded had very little bearing upon the choice made.

6. A small percentage indicated that there was no knowledge of the training necessary to prepare for the vocation decided upon.

7. A very large percentage have had after school or summer employment.

8. Summer or after-school employment was not particularly significant in the choice of a vocation in most cases.

Many of the statements which explained how the choice of a vocation happened to be made are worthy of consideration. Of course, some allowance must be made for the fact that high school students frequently change their minds about a vocation even after they think they have arrived at a definite conclusion regarding the matter. Some of the significant statements given showing the result of probable intelligent consideration are:

1. I thought over all the various professions and talked to professional men, both on my own initiative and through the Hi-Y club, and finally decided to take up engineering.

2. Reading, thought, some observations made me decide to become a doctor.

3. I first became interested in engineering and mechanical work by reading some of my father's books at home. Then I have kept up in the reading of magazines which deal with the work.

4. I heard some talks on astronomy and physics which interested me greatly. I am also interested in mathematics and sciences from books I have read.

5. My grandfather has been superintendent of several great buildings which have been built and is an architect. This, aside from the fact that I have always liked to draw, gave me a great desire to take up architecture.

It is impossible to determine just how much of these statements needs to be discounted. It was observed when these questionnaires were filled out that the students were anxious to give accurate information and for the most part they appeared to be very serious about the matter. Many explanations showed the ability to think seriously and intelligently about vocations, even though no guidance is given in school. The influence of the home in some cases is very good. Supplemented with guidance in the school it should afford excellent opportunity for intelligent choice of a vocation.

Naturally enough, "interest" was the most common reason given in the explanatory statements accounting for the choice made. Undoubtedly, fancy expressed as interest plays too large a part. Ability, opportunity, possibilities, remuneration, home influences, and similar factors were mentioned, but in many cases only one of these played an important part. Characteristic examples of lack of intelligent consideration in choosing a vocation are:

1. I think teaching must be interesting.
2. I expect to be a nurse. I have been in a hospital many times and believe I would like it.
3. I want to be a secretary because one may get from $50 to $75 a week.
4. My father is with the Lincoln people and I can get a position in his office or any place else in the Lincoln Company.
5. A friend of mine is an army aviator. He flew around our house one day, and I took a liking to aviation.

These examples show plainly the need for vocational guidance. The home has failed to give guidance in this respect, and the school has not provided for the neglect. It must be remembered, however, that the rapid increase in the number of vocations is making it impossible for many homes to take the entire responsibility. It is the business of the school to organize information about the many vocations and use it intelligently, emphasizing the needs of individuals.

TABLE I

SUMMARY OF THE RESULTS OF THE QUESTIONNAIRE

	Suburban		Small Town		Rural		Total	
	Yes	No	Yes	No	Yes	No	Yes	No
1. Have you considered the choice of a vocation?	422	197	160	35	52	50	634	282
2. Would you be interested in a course which made a study of vocations?	394	225	160	35	67	35	621	295
3. Do you think such a course would help you decide your vocation?	401	218	163	32	67	35	631	285
4. Have you decided what vocation you will follow?	294	325	126	69	23	79	443	473
5. Has your father's vocation been a factor in your choice?	55	239	28	98	4	19	87	356
6. Have any of your studies led to your special interests or choice?	145	149	74	52	11	12	230	213
7. Have school activities influenced your choice?	82	212	36	90	10	13	128	315
8. Has the present income of your family affected your choice?	38	256	13	113	4	19	55	388
9. Has the income which you will receive affected your choice?	82	212	28	98	8	15	118	325
10. Do you have any knowledge of training necessary in your chosen vocation?	256	38	110	16	17	6	383	60
11. Have you ever had after school or summer employment?	150	144	98	28	9	14	257	186
12. Did this employment affect your choice?	37	257	32	94	5	18	74	369

Outstanding results were noted comparing the three high schools investigated. The need for vocational information, education, and guidance in the rural communities was obvious. Not one of the twelve seniors of the rural high school investigated knew what vocation he would probably follow. Only four had even considered a choice seriously. The lack of early serious thought about vocations in rural communities may be due to two factors; (1) lack of opportunity to know about a variety of occupations; and (2) failure to feel the urge of making one's own living.

The environment which the home and the school provide for the child is a very important factor which affects the choice of a vocation. Vocations are still inherited but not to the extent they were formerly. The rapid growth of industry and the opening of new fields of work has changed the influence which formerly was largely provided by the home. The results of the questionnaire indicated plainly the need for organized vocational guidance, especially in rural communities where first hand information about a variety of occupations is very limited.

THE CUMULATIVE RELIABILITY OF FREQUENT SHORT OBJECTIVE TESTS

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IT is generally conceded that very short objective tests have low reliability.[1] As a result of this knowledge short tests are more likely to be used as teaching than as measuring devices, instructors depending upon longer midterm and final examinations, or upon long final examinations for data upon which to base quarter or semester grades. The present paper attempts to evaluate the reliability and validity of cumulative scores derived from frequent short objective tests. The paper is concerned with the following questions: How reliable are the different sections of a short objective test, such as the true-false section, or the completion section? How reliable is the entire short test? How much does the reliability increase when the scores of subsequent short tests are added to the scores of previous tests? Could semester grades be given,

[1] Ruch, G. M. *The Objective or New Type Examination*, (Chicago: Scott, Foresman & Co.) pp. 46-7.
Paterson, D. G. *The Preparation and Use of New Type Examinations.* Yonkers, New York: World Book Co., 1925.
Sandiford, P. *Educational Psychology.* (New York: Longmans, Green & Co.) p. 320.

with reasonable validity and reliability, upon the basis of the cumulative scores from frequent short tests, thus avoiding the necessity of a final examination? Could all brief testing be dispensed with and a semester grade assigned upon the basis of a final examination only?

METHOD

A college class in Educational Psychology was given twelve short objective tests in addition to a midterm and a final examination during the semester. Ten of these short tests permitted point scoring. Of these ten, one was a test of certain elementary statistical procedures. It differed markedly in content from the other nine, although scored on a point basis. The other nine tests were made up of true-false, one word answer, and completion items. For convenience, the one word answer as well as the completion items will be considered as "completion" items. The totals of the short tests ranged between twenty and forty points. The final examination consisted of two forms which together contained 180 true-false items, 20 multiple choice items, and one word and completion items arranged to score 150 points. The maximum score possible on the final examination was, therefore, 350. The reliability coefficient obtained by correlating Form A and B is .82. At the close of the semester the results were studied by correlating:

1. Odd and even items of the true-false section in each short test.
2. Odd and even items of the completion section of each short test.
3. Odd true-false plus odd completion items with even true-false plus even completion items.
4. Total odd with total even true-false items of Test I plus Test II; Test I plus Test II plus Test III, etc., until all were added in.
5. Total odd and total even completion scores in the same manner as in (4) above until all were added in.
6. Odd and even combined true-false and completion scores in the same manner until all were added in.
7. True-false, completion, and total scores in each combination as in 4, 5, and 6 above with the final examination.

This procedure provided correlation coefficients indicating the reliability of each test as a whole and of the two sections of each test; the reliability of each combination made by adding succeeding tests or sections of tests to preceding scores; and the validity of each combination as judged by the criterion of the final examination.

RESULTS

Table I shows the size of each short test and each section of each test. The one word answer and the completion items are considered as completion items.

TABLE I

SHOWING NUMBER OF POINTS IN EACH TEST AND IN EACH SECTION OF EACH TEST STUDIED

Test	True-False Items	Completion Items	Total Items
1	25	15	40
2	18	12	30
3	12	15	27
4	10	10	20
5	12	23	35
6	15	15	30
7	17	23	40
8	15	16	31
9	18	12	30
10	(Statistical computations)		40
Totals	142	141	323

In Table II are presented the reliability coefficients obtained by correlating odd and even items of the true-false sections; the completion sections and the total scores of each test.

TEST II

RELIABILITY COEFFICIENTS OBTAINED BY CORRELATING SCORES AS INDICATED
N = 37 JUNIORS AND SENIORS
(COLLEGE)

Test	True-False odd with even	Completion odd with even	Total odd with even
1	.48	.64	.65
2	.05	.66	.62
3	.27	.50	.69
4	—.25	.51	.30
5	.04	.57	.45
6	.06	.37	.41
7	.19	.73	.59
8	.19	.61	.64
9	.23	.76	.68
10			.89

TABLE III

RELIABILITY COEFFICIENTS FOR EACH COMBINATION OF TESTS OR SECTION OF TESTS AS INDICATED. N = 37 JUNIORS AND SENIORS

Tests	True-False odd with even	Completion odd with even	Total Score odd with even
1	.48	.64	.65
1 + 2	.34	.66	.70
1 — 3 incl.	.51	.80	.77
1 — 4 incl.	.40	.82	.76
1 — 5 incl.	.39	.82	.73
1 — 6 incl.	.38	.79	.76
1 — 7 incl.	.33	.84	.77
1 — 8 incl.	.33	.88	.82
1 — 9 incl.	.36	.86	.83
1 —10 incl.	Statistical computations		.80

It will be seen that the completion section is in every case more reliable than is the true-false section even though the latter section may

have a greater number of points than the former. The computation test is by far more reliable than any true-false or completion section.

Table III presents the reliability coefficient for each combination of tests.

In so far as the true-false items alone are concerned nothing was gained by accumulating scores. The completion items show a somewhat irregular but rather definite gain reaching its maximum by the time the 8th section was added in. The total score shows a rather regular increase in reliability, but this is usually less than that shown by the completion test alone. To aid in the interpretation of the increase in reliability, the first and last reliability coefficient of the completion column and of the total column are compared with their corresponding coefficients of alienation:

	r	k	1-k	gain	% of gain
1st completion	.64	.77	.23		
Last completion	.86	.51	.49	26	113
1st total	.65	.76	.24		
Last total	.83	.56	.44	20	83⅓

If we use 1-k as a basis for comparing the predictive value of the first and last combination, it will be seen that the cumulative reliability of the completion sections alone increased 113 percent while the cumulative reliability of the total test scores, exclusive of computation, is 83⅓ percent greater than that of the initial total score.

The fact that the cumulative reliability is so much greater than the reliability of the initial test does not mean that the cumulative score is necessarily more valid. The single computation test yielded a reliability coefficient greater than any other test or any combination of the other tests. Yet one would not be justified in assigning a quarter or semester grade on the basis of the scores on this computation test alone. For the data in hand we had only two criteria of validity. The first was the total semester score into which the short quizzes enter and on the basis of which the semester grade was actually issued. Since the short tests entered into the final semester score it was not considered desirable to correlate them with the total semester score. The second criterion of validity available was the final examination. Correlations were computed between the score on this final examination and the various combinations of short tests as shown in Table IV.

Since the final examination had no part comparable to the computation test, the last combination as shown above might be expected to show a lower correlation than the one preceding it. It will be seen that there was some increase in the validity of the true-false totals but it is very

TABLE IV

CORRELATION COEFFICIENTS BETWEEN TOTAL FINAL EXAMINATION SCORE AND VARIOUS COMBINATIONS OF TRUE-FALSE, COMPLETION, AND TOTAL SCORES OF THE SHORT TESTS

Test	True-False Total	Completion Total	Total Score
1	.45	.27	.48
1 + 2	.40	.57	.61
1 — 3 Incl.	.49	.65	.64
1 — 4 Incl.	.48	.62	.65
1 — 5 Incl.	.53	.70	.72
1 — 6 Incl.	.58	.69	.73
1 — 7 Incl.	.55	.72	.74
1 — 8 Incl.	.61	.72	.76
1 — 9 Incl.	.67	.71	.77
1 —10 Incl.	Statistical procedure		.72

irregular. The completion totals show a more regular increase in validity, although here, too, there is some fluctuation. The totals show a rather regular increase in validity (as judged by the assumed criterion). Again comparing the first with the ninth coefficient in each case we find the following comparisons:

		r	k	1-k	gain	% of gain
True-false	(1)	.45	.89	.11		
True-false	(9)	.67	.74	.26	.15	136
Completion	(1)	.27	.96	.04		
Completion	(9)	.71	.70	.30	.26	650
Total	(1)	.48	.88	.12		
Total	(9)	.77	.64	.36	.24	200

The completion section showed an enormous gain in predictive value when compared with the assumed criterion of validity, that is, the final examination. It does not follow that it is the most valid, even according to the criterion set up. It is obvious from the foregoing figures that the most valid combination is the combination of total scores obtained from tests 1 to 9 inclusive since it correlates with the assumed criterion, .77. In the use of the total cumulative score from test 1 to 9 inclusive there would be less displacement from the position held on the final than would occur in any other combination of short tests or sections of them. The amount of displacement would not be very great. According to Otis[2] there would be approximately 89 chances out of 100 that a student would be displaced no more than one tenth of the distribution of the final by using the cumulative short test scores. The same would hold true if one chose to substitute the final examination as a basis for assigning grades and assumed that the frequent tests were the criterion of validity. A

[2] Otis, Arthur S. *Statistical Method in Educational Measurement*, (Yonkers, New York: World Book Co.) pp. 224-5.

student in the upper half of the A group (the top tenth) would have 89 chances out of 100 of remaining in the A group, and 99.2 chances that he would not be placed lower than a "B" if the usual five point system of marking were employed.

With such displacement it would seem to be fairly practical to use either the cumulative score on the short test or the final alone as a basis for grades. The decision as to which should be used would depend upon other factors. We have shown elsewhere that there is reason to believe that the short tests have some motivating effect, although it is not pronounced, and might not justify the time and expense required for their preparation and use.[3] There is rather definite evidence that they have a good effect upon the student in other ways, however, which may justify their use.[4] The decision as to which is preferable would seem, according to our data, (which are admittedly inadequate and suggestive only) to rest with the instructor in charge. There seems to be no very great reason why a single final examination might not be sufficient except for the psychological effect upon the student.

REPORTED PREFERENCE AND PERFORMANCE IN PROBLEM SOLVING ACCORDING TO INTELLIGENCE GROUPS

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THE question of pupil preference and performance with respect to various types of arithmetic problems has never been extensively studied. In a recent investigation[1] the writer attempted to determine the degree and significance of the relationship between reported preference and performance in arithmetic problem solving. The subjects used were pupils of junior high-school level. One phase of this study dealt with the relation of general intelligence to types of problems best liked and most successfully performed by pupils of these grades. A report of the findings with reference to this problem is reported in this article.

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[3] Turney, A. H. "The Effect of Frequent Short Objective Quizzes Upon Achievement in Educational Psychology." *School and Society.*

[4] *Ibid.*

[1] Bowman, Herbert L. "The Relation of Reported Preference to Performance in Problem Solving." University of Missouri Bulletin, XXX (Columbia: University of Missouri, 1929), 52 p.

PROCEDURE

In order to obtain data for such a study it was necessary to employ a test which would record reports of preference with respect to arithmetic problems, and at the same time measure performance on the problems. Accordingly a test comprising fifty problems, arranged in two forms of twenty-five each, was constructed.

Our plan called for the presentation of groups of problems which differed from one another in descriptive content enough that preferences could be distinguished. The differentiated types of problems used in the test were as follows: (1) Problems based upon adult life activities, (2) problems based upon child life activities, (3) problems whose settings are to be found in the field of science, (4) problems so stated as to take on the nature of a puzzle, and (5) problems of pure computation only, in which directions for the correct procedures were given. For convenience these types are called, (1) the adult type, (2) the child type, (3) the science type, (4) the puzzle type, and (5) the computation type.

The fifty problems used in the test were arranged in groups of five to a page, with one of each of the types named above occurring in each group. The pupil was instructed to solve the five problems of the group, then to indicate which one of the group he preferred or liked best. It was necessary, of course, to keep constant the factor of computational difficulty among the problems of each group so that the preference for a problem would be based upon the descriptive setting or situation rather than upon this difficulty factor.

GENERAL INTELLIGENCE AND PREFERENCE

Of the 564 junior high school pupils who took the complete test there were 413 subjects whose IQ's had been calculated according to the Otis Self-Administering Test of Mental Ability. These pupils were divided into groups for the purpose of studying the effect of general intelligence upon preference and performance. Three groups were made, Group 1 consisting of pupils of the upper quartile, approximately, Group 2 of the middle fifty percent, and Group 3 of the lower quartile. The scheme following shows the divisions made.

Group	Range	N
1	All pupils with IQ's of 115 and above	100
2	All pupils with IQ's between 88 and 115	203
3	All pupils with IQ's of 88 and below	110

In Table I are found the percentages of the total reported preferences that the different types of problems received according to general intelli-

gence groups. A comparison of the groups seems to indicate that those of lower general intelligence prefer to a less degree the descriptive problems, represented in the table by the first three types, than do those of higher general intelligence. Examining the table from left to right it can be observed that there is a distinct decrease in the proportion of preferences reported for the first four types. On the other hand, it can be noted that the computation type is increasingly preferred as you go from the group of highest intelligence to that of the lowest.

If we compare the preference percentages reported for the different types of problems, we learn that there is less variation among those of the higher intelligence groups, suggesting that pupils of superior ability are less concerned about the problem settings than are those of lower ability.

TABLE I

PERCENT OF TOTAL PREFERENCE REPRESENTED BY EACH TYPE, BY INTELLIGENCE GROUPS

Type	Group 1	Group 2	Group 3
Adult	18.4	19.1	16.7
Child	24.3	20.9	20.6
Science	19.7	15.3	14.6
Puzzle	15.9	14.1	11.3
Computation	21.7	30.6	36.8

Table reads: 18.4% of the problems preferred by Group 1 were of the adult type, 19.1% of those preferred by Group 2 were of the adult type, etc.

The mean number of preferences as well as the mean performance on each type by intelligence groups, together with the SD's and PE's of the means are not shown here, but are given in the original report previously referred to. It was thought that for the purpose of this article the percentages of preferences and performances as shown in Table I and Table II would give a sufficient and perhaps a clearer picture of relative preference and performance. Suffice it to say that the differences run as here indicated and seem to be real and significant.

GENERAL INTELLIGENCE AND PERFORMANCE

A comparison of performance with respect to types of problems was made, using the same general intelligence groups as compared in Table I. We see from the results, as shown in Table II, that the pupils of Group 1, who are of high intelligence, are more uniform or consistent in their performance with respect to different types than are those of lower general intelligence.

TABLE II

PERCENT OF TOTAL PERFORMANCE REPRESENTED BY EACH TYPE, BY INTELLIGENCE GROUPS

Type	Group 1	Group 2	Group 3
Adult	18.2	17.7	18.1
Child	20.2	18.8	19.6
Science	16.6	15.3	12.7
Puzzle	20.8	19.0	14.6
Computation	24.2	29.2	35.0

Table reads: 18.2% of the problems solved by Group 1 were of the adult type, 17.7% of those solved by Group 2 were of the adult type, etc.

A study of Table I and Table II reveals that the pure computation type and the child type of problem each rank relatively high in both preference and performance by all pupils. The adult type and child type seem to be somewhat equally well performed by all pupils, though the child type is more preferred. The preference for and the success in performing problems of the science type and the puzzle type decrease uniformly as you go from the pupils of high intelligence to those of low.

CONCLUSIONS

1. There is less variation in both preference and performance by pupils of higher general intelligence with respect to types of problems than by those of lower. Pupils of high ability tend to report no distinct preference as to type of problem and tend to perform more nearly equally well on all types.

2. Pupils of lower ability report preferences more consistently for problems involving little or no complex situations. Also they perform relatively better on these than on those requiring analyses of involved descriptive situations.

3. The pupils of lower intelligence levels indicate little preference for and ability in problems of the science type and the puzzle type. This would suggest that such problems should be constructed on a lower ability level when presented to pupils of this kind.

4. Pupils of high ability in problem solving and in intelligence show a comparatively high degree of performance and preference with respect to problems of the science type. It is probable more problems of this type might be used profitably in arithmetic courses. However, they should be constructed on a lower ability level when presented to pupils of low ability.

5. Of problems involving descriptive settings the child type is most preferred and most successfully performed by all groups of junior high

school pupils. The adult type ranks second and the science type is lowest in both respects.

6. Problems dealing with child life activities seem to be highly preferred and successfully performed by all pupils of the junior high school grades. We are led to believe, therefore, that if arithmetic problems, through their solutions, offer to children means of meeting real needs they become vital factors in the education of the child.

7. Building up interest in problem solving is best accomplished by having children work problems which are not too difficult and which represent genuine childhood situations. This is especially true in the case of pupils who are just at or below the median ability of the class.

8. The inference may be drawn from the findings of this study that preferences for, or so-called interest in certain problems, are probably occasioned by the pupils' experiences which have been built up, and that they are influenced by whatever growth and changes occur in the experiences. The evidence as found seems to justify the belief that with respect to problem solving by pupils of the junior high school grades, preferences are not permanent and inherent qualities but are dependent upon ability resulting from experience with the respective situations involved.

EDITORIALS

SCIENTIFIC THINKING IN EDUCATION

Recently I picked up the house organ of a city school system in which teachers who attended the Department of Superintendence meeting in Washington had contributed brief notes on that convention. One said in effect though, of course, not in these words,—"I enjoyed very much the address of Dr. X in a certain sectional meeting. He said exactly what I think about" (a controversial subject). It so happens that I too attended this sectional program and heard Dr. X and three other speakers also. It may be of interest that Dr. X presented no evidence whatsoever but argued wholly from what he called the philosophical point of view. Each of the other speakers presented evidence which was in favor of the opposing point of view but the above mentioned teacher was not impressed by evidence. It did not coincide with what was already a settled conviction.

Some time ago I was in a group of college teachers, representing as many departments as there were persons present. In the course of the discussion, some one said, "The evidence of research indicates that this factor is not an influential one in the situation." Another immediately rejoined with some heat, "I don't care what the evidence is. I don't believe it." The evidence failed to coincide with the settled conviction.

Some years ago the editor of an educational magazine, commenting upon a doctor's dissertation which had just been published said, "This study ought never to have been made; having been made, it ought not to have been accepted; having been accepted, it ought never to have been published." The evidence presented therein did not coincide with the editor's convictions.

I might multiply illustrations and you can doubtless do the same. All would be instances in which educated and educational people have rejected research evidence in favor of prejudice, of opinions formed without data. Thinking about these instances of unscientific attitude has led me to wonder whether the scientific attitude can be taught. Each of these I have quoted doubtless follows evidence, is quite scientific in his thinking within his own narrow field but outside that—oh, that seems to be

quite another matter. If we specialize in one field, we learn the scientific mode of thinking in that field, but how often we fail to apply our scientific mode of thinking in other situations. We may, when faced with the question, give intellectual assent to the proposition that the essence of scientific thinking consists of careful collection of all data available, thorough analysis of these data, and the drawing of conclusions warranted by these data. But in practice many of us seem to fail to apply this type of thinking outside our own field.

Perhaps one of our greatest needs at present is not more research in subject matter, in teaching method, in the learning process, as we ordinarily think of these things, but in how to develop in our children a scientific attitude which will function not only in science, or in the field of specialization, but in every phase of their lives. An honest inquiry after truth, an unwillingness to accept without evidence, a habit (?) of suspending judgment until data can be secured, a questioning of the bases upon which judgments have been formed,—these ought to characterize educated people. These are evidences of the functioning of the scientific spirit. May we not have a large amount of research on how to develop this attitude, this spirit, to the place where it precedes judgment and action in every phase of our complex life?

E. J. ASHBAUGH

REVIEWS

Address all communications relative to book reviews to Editor E. J. Ashbaugh, Miami University, Oxford, Ohio.

SEIDLIN, JOSEPH. *A Critical Study of the Teaching of Elementary College Mathematics.* New York City: Teachers College, Columbia University, 1931. x + 107 pp.

This book is a first hand study of classroom practices in the teaching of college mathematics made by a college teacher of mathematics. Its object is "to investigate and analyze educational practices and methods of collegiate teaching in the field of freshman and sophomore mathematics." The conclusions are based upon data from "150 completely recorded classroom recitations and 50 intrinsic interviews." Ninety-six of the recitations were freshman classes, 47 were sophomores, and 7 were junior classes. The subject matter included solid geometry, trigonometry, analytic geometry, calculus, mechanics, advanced calculus, and differential equations. The teachers visited were all experienced teachers, represented various ranks, and were selected from 18 different colleges and universities in or near New York City. The lessons were classified by the author as follows:

I. The entertaining lecture, students interested but passive. (8)

II. Lecture, but with student questions and rather active participation. (14)

III. Recitation, pupils using as much time as instructor, questions spontaneous, instructor resourceful and enthusiastic. (10)

IV. Combination of blackboard and oral recitation. Students interested, instruction casual and entertaining. (8)

V. A ground-covering, textbook-repeating, recitation, done mechanically. (45)

VI. A carefully planned question and answer development. (4)

VII. A blackboard recitation, at which the students recite and get a grade. (61)

The figure in the parenthesis after each type gives its frequency. It is evident that, in the opinion of the author 105, or 70 percent of all classes visited, were of type V or VII, the formal textbook-repeating, mechanical, recitation type, involving little real student activity. From the author's standpoint, methods III, IV, and II were most desirable since they showed "enthusiasm, general cheerfulness, student-teacher coöperation, a small percentage of failures, and a large percentage of election of higher courses."

It is unfortunate that Dr. Seidlin failed to indicate the number of teachers visited and the number using each type of lesson procedure. The reader is left to assume that the 150 lessons were evenly divided among the fifty teachers with whom "intrinsic interviews" were held. Since the frequencies given are not multiples of three, it must be that some teachers used different types of procedures on different days. The other alternative, of assuming an uneven distribution of the 150 lessons among the fifty (p. VII and 102) or 66 (p. 103) teachers visited, would be even more annoying in its im-

plications. Furthermore no mention is made of the method of recording the lessons. If the recording were done by means of a concealed microphone, or a phonograph, or by one visitor carefully recording everything that happened, or by a man and his stenographer both recording and perhaps discussing what happened, it is evident that the lesson recorded would be affected in varying degrees. However, since no great weight is attached to the exactness of the count, these two omissions are not so serious as they may at first appear to the critical reader.

Illustrations are given of typical classroom procedures using each of the seven types, concluding with a rather general condemnation of the ground-covering and blackboard techniques. These illustrations are well presented and any college teacher can use these as a mirror to see himself as he is or as he varies from one type of procedure to another. The selection and reproduction of these lessons is well done, in fact, an important part of the contribution.

Chapter II presents Pyle's Principles of Learning as the basis for judging the effectiveness of the various methods of teaching. The violations of these principles by the various types of teaching is presented by specific illustrations. Questions concerning the nature of good teaching showed that high scholarship on the part of the teacher was considered the chief criterion. The author presents a group of "determinants" of good teaching. These are ranked on the basis of the judgments of "nine professors and advanced students of education." They constitute a scoring card for college professors similar to that used in judging "prize apples and show horses."

In Chapter IV, Dr. Seidlin makes a stimulating contribution when he points out the wide use of examinations as a stimulus and objective for students, and the too frequent use of the textbook as a final authority. In further analysis of the lessons Dr. Seidlin makes a count of the questions asked by both students and teacher in each type of lesson. The arithmetic mean was twenty-one questions asked by the teacher, but of these only four were "good" questions, according to Dr. Seidlin. The mean number of questions asked by students in the 150 lessons was three, ranging from 0 to 11. Judging by the number and type of student questions, student participation in the class work of college mathematics is far from commendable.

In a discussion (chapter VI) of the effects of productive research on good teaching, Dr. Seidlin picks several illustrations from the observed lessons of teachers who made bad mathematical errors in teaching. He concludes from these illustrations that these teachers had not prepared their lessons on these elementary ideas. Then, although he has no evidence to uphold the contention, he seems to conclude (p. 94) that the reason they had not prepared their lessons was because they were engaged in productive research. The weakness here is evident and the author wisely states in the concluding paragraph of this chapter that the data do not establish the above conclusion but merely question the practice of making teaching appointments on the basis of productive research.

The author concludes that (1) the blackboard and lecture methods are predominant in the teaching of college mathematics, (2) the teaching of college mathematics is ineffective, (3) college teachers are not hostile to suggestions for improving teaching, (4) in smaller colleges teaching is the "pre-eminent concern of the teachers"; in the larger colleges "teaching is avowedly subordinated to productive research," (5) special

training for teaching in colleges, both pre-service and in-service, is needed and not resented, (6) the types of lessons, ranked in order of desirability (in ascending order) are as follows: V, VII, I, VI, II, IV, III.

The truth of these conclusions may not be questioned; however, the evidence presented in the study is inadequate to justify some of them. They depend upon the expert opinion of the investigator, although that dependence is not in all cases made clear. For instance no data were presented in order to justify conclusion (4) above to show that teachers in smaller colleges used the superior methods III, IV, and II to a greater extent than did teachers in larger colleges.

Although (conclusion 2) college teaching of mathematics may be ineffective because of (1) "often as many as 40 percent of the students fail," or (2) "too few students elect sophomore mathematics" or (3) "students who did excellent work in high school lose interest in college mathematics," yet no evidence is presented in the dissertation to support any except the second of these reasons and that evidence neglects to take into consideration the fact that freshman mathematics is usually required and that therefore a large dropping off is to be expected. The evidence does display beautifully however, for ten schools, an increasing tendency to elect sophomore mathematics in schools where methods II, III, and IV predominate.

While in general this study gives the impression of being overzealously written, with some conclusions not justified by the data presented, and some statements in the summary which were not previously presented, yet the study presents many important and interesting facts. It reproduces excellently several illustrative lessons in college teaching which should, unaided, contribute to the improvement of the profession, and it is an outstanding pioneer study in the field of the teaching of college mathematics.

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NEULEN, LEON. *Problem Solving in Arithmetic.* New York: Columbia University, 1931. vii + 87 pp.

The author's chief aim is to determine the proper grade placement of one-, two-, three-, and four-step written problems in arithmetic. The grades considered are three, four, five, six, and seven.

Written problems were prepared "similar in nature and difficulty to those found in currently used instructional and test materials for these grades." For third grade there were prepared 25 one-step and 25 two-step problems. For the fourth and fifth grades separate lists were prepared each with 25 one-step, 25 two-step, 25 three-step, and 25 four-step problems. The fifth grade list was used also with sixth and seventh grade pupils.

The tests were administered early in the year in reasonably small parts as preliminary tests. The computational errors were noted and made the basis of drill for six or eight weeks until 80 percent accuracy had been attained on the computations involved in the tests. Then the same tests were again administered. The tests were given to over 2,000 pupils, grades 2 to 7, in two school systems.

The task of the author is to analyze and interpret the results. This is done with the aid of the usual correlations among mental ages, intelligence quotients, reading abilities, computational scores, and problem scores. P. E.'s are not figured.

The author assumes:

That present school practice in teaching problem solving in arithmetic is satisfactory (p. 7).

That present standardized tests of

problem solving ability of pupils are satisfactory (p. 27, line 32).

The scores of 80 percent (8 responses out of 10 correct) in computational phases of arithmetic are satisfactory (p. 6, line 13).

That median scores of 60 percent in grades 4 and 5, *e. g.*, are satisfactory on two-step problems (conclusion 2, p. 68).

That I. Q.'s obtained from the giving of a single group test are reliable (p. 13, l.3). This is the apparent assumption; details on I. Q. are not given.

Findings. Based upon a 60 percent mastery, step problems of the usual textbook type should be assigned to grades as follows: one- and two-step problems, grades 3, 4, 5, 6 and 7; three- and four-step problems of 5th grade level, grades 6 and 7.

"If computational difficulties had been increased with each of grades 6 and 7, it is probable that little more than one- or two-step problems would have been mastered."

"The data reveal no consistent correlations between problem-solving ability and intelligence levels" or problem solving ability and reading ability.

"Our schools have accomplished very little in the successful teaching of problem solving."

There are not enough children involved to entitle this study to classification as a major research; twenty years ago it would have been so classed. It must be classed as a minor research because it does little more than administer a series of the usual type of problem tests and summarize results. Test results with good interpretation are being made available throughout the country as more or less matters of routine, by principals, superintendents, and students of education.

The study, while claiming to be objective, apparently lacks the objective viewpoint in that it sees only schoolroom and textbook situations. Arithmetic disassociated from life and devoid of meaning for the child is little more than mental discipline. Such discipline based upon a 60 to 80 percent mastery is of doubtful value. Such mastery is unsatisfactory, and this the author recognized in his summary and conclusions.

The study gives evidence of careful work and a mastery of the techniques usually employed in this type of investigation. The techniques used are as refined as the study appears to justify. The findings, while largely negative, are significant. The most valuable conclusion is the one indicating the failure of the schools in teaching problem solving. This agrees with the findings of other significant studies and with observation of current practice. Problem solving still remains a challenge for some new investigator.

SMITH, WILLIAM A. *Secondary Education in the United States.* New York City: Macmillan Company, 1932. xvi + 429 pp.

In 1925, Dr. Smith made a significant contribution to the literature of Secondary Education by the publication of his book on the junior high school. This text by virtue of its clear statement of the underlying philosophy of the junior high school became one of the standard books on this new unit in educational organization.

Secondary Education in the United States presents in an attractive form the history, present status, and trends in secondary education. The author has endeavored in this book "to single out and emphasize those aspects of the situation which are of the most immediate concern to the teacher—actual and prospective." The chapter titles are evidence that the

author in this book has varied considerably from the practice followed in such recognized texts as those of Inglis, Koos, Johnson, Monroe-Weber and others. Little or no attention is given to administrative problems, vocational education, and the means and materials of secondary education. The author, after presenting a comprehensive survey of the field of secondary education both in this country and in Europe, discusses the various problems of the high school in terms of the teaching situation. Herein lies the value of this book. It is to be regretted, however, that he did not give detailed discussion of the rôle of the various subjects in the high school curriculum.

The first three chapters are devoted to the historical background of the present public secondary school and the treatment is sufficient to furnish the student with the orientation necessary to an understanding of the "pivotal issues" discussed in the book. An illuminating chapter is given on the programs of secondary education in other countries which should enable the student to compare them with the American program. The two chapters dealing with "the scope and functions of secondary education" and the "characteristics and needs of secondary school pupils" are brief but sufficiently adequate to provide the student with a clear concept of the purpose of secondary education and the problems with which the secondary school is now confronted. The chief contribution in this text is the five chapters devoted to scientific curriculum-making, current curriculum practices and trends, and the extra-curriculum. These chapters contain the most concise statement of the philosophy and trends in curriculum-making now available in educational literature. The author's excellent summary of the National Platform for Curriculum Construction, adapted from the Twenty-Sixth Year Book, *Foundations of Curriculum-making*, Part 2, Chapter I, is in itself a contribution worthy of mention. The clear presentation of the learning unit and the unit method of teaching based upon it will be of interest to students of secondary education. The author, perhaps, is somewhat prejudiced in favor of the Morrison Plan. The final chapter of the book is concerned with the changing conceptions and practices of teaching in secondary schools. It is a lucid statement of the newer conceptions of teaching in accord with accepted and basic principles of psychology.

The book is a valuable contribution to the literature of secondary education. Its clear and scholarly treatment of the problems of secondary education make it a text suitable for use in a course dealing with the principles of secondary education.

WHEAT, HARRY GROVE. *The Psychology of the Elementary School.* New York: Silver, Burdett and Company, 1931. viii + 440 pp.

The title of this book rather leads one to expect it to set forth certain basic and underlying psychological principles of learning and teaching which appear to differentiate the elementary school from other levels of learning. Without the presentation of much evidence on the case the author himself appears to make the assumption that such psychological differences in the problems at these several levels do exist. In the book itself, however, 369 of the 433 pages of discussion deal with the so-called psychology of special subjects.

Much of the treatment of each of the special subjects of language, arithmetic, reading, handwriting, spelling, social science, history and geography is his-

torical and genetic in its character. The reader may well wonder whether the book might not more properly be called "A Philosophy of Elementary School Subjects."

In his prefatory statement the author makes clear that he desires to treat a middle ground somewhere between the new type of "child-centered school" in which "the pupil is the leader and the teacher the minister of his desires" and the "old-fashioned" school in which "the teacher is the driver" in a very real sense of the term. He criticises the typical school (a compromise of the "old" and the "new") as consisting mostly in "the psychology of motivation, of drill, of testing, of failure and of remedial work." Yet he proceeds to present his psychology, not as that of the child facing varying social situations to which he must adapt himself, but from the standpoint of "subject-matter" itself. Eight of the eleven chapters are from this point of view.

However, in spite of the fact that certain of these chapters on the special subjects are made up of many solid pages of reading, unrelieved by illustrative material, and possibly a too liberal amount of space is allotted to historical and developmental background, they will be found to be most helpful reference reading. Each chapter is extensively footnoted and is accompanied by the usual comprehensive bibliography of related references. Approximately three hundred titles appear in the chapter bibliographies, the majority of which are quite recent. Two-thirds of the titles bear dates within the past ten years, and one-third of the titles are dated since 1925. No critical analysis or classification of the reference material used in the manuscript was made but the reader was strongly impressed that the majority of the references deal with general philosophical discussions rather than with exact experimental evidence on the problems. Numerous omissions of well-known contributions to the psychology of the special elementary school subjects might be noted.

In spite of these rather specific critical comments which the present reviewer has seen fit to record, this book contains much valuable and stimulating material. The chapters on reading, language, and arithmetic are particularly well done and may well be studied by every teacher and supervisor of these subjects. In addition to its practical value to the classroom teacher the book should be very useful to advanced and graduate students interested in broadening their range of information and points of view in these special subject matter fields.

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GOODSELL, W. *Pioneers of Women's Education in the United States.* (Education Classics). New York: McGraw-Hill Book Co., 1931. viii + 311 pp.

In a book of slightly over three hundred pages, the author has attempted a survey of the work of three pioneer women educators of the United States: Emma Willard, Catherine Beecher, and Mary Lyon. Of these three hundred odd pages, a goodly proportion is devoted to excerpts from the writings of the women discussed. Hence, the biographical sketches may be described as encyclopedic, although the author declares that "the biographies of these pioneers are recounted rather fully." A laudable motive actuated Mr. Goodsell "to fill an existing need for an account of the part played in the historical development of American education by certain outstanding women," a condition which is equally true of the

part played by women in all aspects of the development of American life.

In the selection of his material the author leans heavily upon known biographies and other material, particularly in the sketches of Emma Willard and Mary Lyon. In the case of the former, for example, Lutz' *Emma Willard, Daughter of Democracy*, published in 1929, furnishes some of the quotations from the writings of this educator as well as being the basis of some of the secondary material. M. A. DeWolfe Howe's *Classic Shades: Five Leaders of Learning and Their Colleges*, published in 1928, contributes an appreciable amount of the information presented on Mary Lyon. Less has been written on Catherine Beecher and here Mr. Goodsell gathers together more unavailable and inaccessible material than in the treatment of the other two educators. Much use is made of quotations woven into the general narrative to fortify a statement made by the author. But these serve a good purpose. However, one is confronted by the question of why, in so brief a space, so much material was devoted to the writings of these women. In view of the brevity of treatment it would have seemed wise to have given a full although concise account of these leaders in education and have prepared a separate book on source material.

Regardless of the selection of material, however, it should be said that a book such as this will do much to bring to the attention of students of the history of education the outstanding points in the lives of these notable educators. The style of the book is clear, concise, and interesting. The portrayal of the background of the early lives of these women is well done, leading up to their activities as pioneers in the field of women's education. There is no bibliography, but footnotes indicate in some instances the source of information. In giving footnote citations, *op. cit.*, is confused with *ibid.*, frequently, especially on pages 28, 33, 124, and 128. A proofreading error is found on page 30 where "ouch" is obviously intended for "touch." The book has a brief index and reproductions of a photograph of each of the persons discussed.

BESSIE LOUISE PIERCE
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MURSELL, J. L., and GLENN, M. *The Psychology of School Music Teaching.* Newark: Silver, Burdett and Company, 1931. v + 378 pp.

Four factors combine to make this book one of the most outstanding works in the field of music education. The first factor is the happy combination of authorship, James Mursell, psychologist and pianist-musician, and Mabelle Glenn, musician and ardent student of music pedagogy. The second factor is the masterful method of relating music, the art, with music, the science. Third, although much pioneer work has been done in the field of music psychology, the present work is the first successful attempt at bringing together the many available studies and applying them to the whole field of music education. Fourth, the authors have presented an entirely satisfactory study of the two most needed fields of school music, application of psychological and pedagogical principles to the subject, and the place of appreciation in music education.

Probably the best chapters are those on musicality, appreciation, and objectives, in which the authors make the following conclusions: (1) that music is not a lonely ability but has natural affinities for other abilities, and is, in general, possessed by people with superior general ability; (2) that musicality is universal; (3) that the heart of music education is

appreciation; and (4) that the educational value of music education may be summed up under four points: music education is a progressive reconstruction of experience; music education has value as discipline; music education is an enterprise in fuller living; and music education has an essential place in creative democracy.

The various chapters contain a strange admixture of scientific fact and empirical theory, but it must be said that although intermingled, the two are always labeled and readily distinguished. One cannot help noting the ingenious articulation of the old and the new in education. At times, the work reads like a chapter from Spencer and, at others, there appear excerpts from Dewey.

The authors have carefully avoided the subject of methodology, but have clearly defined the issues and have made an appeal for the supplanting of the time-worn empirical methods by those more modern, and scientifically tested. The aims of music education are challenged, and appreciation is set up as the major objective, together with a plea for a closer articulation between music and the other subjects. One point emphasized throughout, is the tendency on the part of present-day music educators to consider and present the subject of school music as training rather than education.

From the standpoint of organization, the book is an excellent one. Complete bibliographies and summaries are included with each chapter, and the introduction of subject matter is ideally progressive. One hopes that this work will be but the beginning of even better, more complete studies in this field.

ARCHIE N. JONES
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NASH, J. B. *Administration of Physical Education.* New York: A. S. Barnes and Company, 1931. xiii + 491 pp.

This book is an important addition to the slowly expanding literature of physical education. It represents a fine attempt of one educator to tell others of the intricate administrative problems in this "special" field.

Physical Education is not the most clearly understood element in the curriculum. It is reported to be the fastest growing. It is surely the most spectacular. If the program itself is understood as embracing all of the inter-school athletics, intramural sports, health instruction, and health service in addition to the traditional required service classes, it becomes the most complex. Most assuredly it is not a field which school administrators can take for granted. The Carnegie Reports indicated the grief which has befallen school sports because administrators thirty years ago failed to see physical education including sport as an educational enterprise. The hope for the future lies in the attention, study, and understanding which school administrators can bring to health and physical education as an element within the curriculum.

Dr. Nash has written a book replete with concrete, practical plans and procedures for administering physical education in schools. No attempt is made to describe health education or health and physical education in colleges. His chapters include unified administration, selecting objectives, organization of departments and classes, routine administration, and the checking of results. Features of the book and the bibliographies and problems at the end of each chapter. For all those who want to know "what they are doing in other places" this volume is an oasis. Dr. Nash has presented actual

situations, then drawn his recommendations from them. All of which makes the book usable as a text for professional physical education courses and as a reference for physical education units in courses in administration. Better than that, the book should be in the library of all principals and superintendents.

So fundamental is the reviewer's wish that this book might be read by school administrators that no quarrel will be made with the minor shortcomings such as the printing on the home-made charts, the bold caps so profusely used, or the author's distortion of professional terminology. The book, as a whole, is sound and worthwhile.

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RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to Editor A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

ALTHAUS, CARL B. *Some Facts Regarding Economic Conditions in Kansas and Their Relation to Financing the Public School of the State,* The Kansas Teachers Association, Topeka, Kansas, 1932. 32 pp.

Contains information relating to economic conditions in Kansas; agriculture, oil and minerals, manufacturing, public utilities, business, etc.; the relation of economic conditions in Kansas to financing the public schools: measures of the ability to support the schools, school taxes, etc.

ANONYMOUS. *Recent Theses in Education:* An annotated list of 242 theses deposited with the Office of Education and available for loan, Pamphlet No. 26, United States Department of Interior, Washington, D. C. 1932. 41 pp.

An annotated bibliography of recent theses in education. Classified according to the following divisions: administration and finance; buildings and equipment; curriculum studies; education in foreign countries; educational history and biography; educational psychology; religious and character education; social aspects of education; special groups; student personnel problems; and teacher training and status.

BISHOP, RALPH CHESNEY. *A Study of the Educational Value of Military Instruction in Universities and Colleges,* Pamphlet No. 28, United States Department of the Interior, Washington, D. C., 1932. 24 pp.

Presents a statistical analysis based upon some ten thousand questionnaires relating to the value of military instruction.

CHURCH, H. V. (editor) *Proceedings of the Sixteenth Annual Meeting of the Department of Secondary-School Principals of the National Education Association,* Washington, D. C., 1932. 330 pp.

Contains a summary of papers presented to the department of secondary-school principals at their annual meeting, February 22, 23, and 24, 1932.

CRABTREE, J. W. *Administrative Practices Affecting Classroom Teachers;* Part I, The Selection and Appointment of Teachers; Part II, The Retention, Promotion, and Improvement of Teachers, Research Bulletin of the National Education Association, Washington, D. C., 1932. 76 pp.

The first of these bulletins contains information on the training requirements for newly appointed teachers, experience requirements for newly appointed teachers, appointment of married women as teachers, appointment of local residents as teachers, routine procedures in the selection of teachers, and a selected and classified bibliography. The second of these bulletins contains information on

the term of employment for teachers, teachers' salaries and salary scheduling, sick leave and related problems, leaves of absence for professional or cultural improvement, teacher rating, and a selected and classified bibliography.

KEELER, LOUIS W. *Results of the Testing Program in the Grass Lake Public School*, Bureau of Educational Reference and Research, University of Michigan, Ann Arbor, Michigan, 1931. 38 pp.

This bulletin is published to assist superintendents, principals and teachers in the analysis of presentation of the results obtained from tests used in testing programs.

O'BRIEN, F. P. *Supervisory Assistance in Teaching Geography and History*, University of Kansas Bulletin of Education, No. 7, Bureau of School Service and Research, University of Kansas, Lawrence, Kansas, 1932. 31 pp.

Explains diagnostic procedures and gives suggestions for the improvement of teaching in geography and history.

PIERON, HENRI. *L'Annee Psychologique* (Psychological Annual), I, II, Librairie Felix Alcan, Paris, 1930. 1096 pp.

A carefully annotated bibliography on the subject of psychology, containing summaries of research published in English, French, German, and other languages.

RATCLIFFE, ELLA B. *Scholarships and Fellowships:* Grants Available in United States Colleges and Universities, Bulletin, No. 15, United States Department of Interior, Washington, D. C., 1932. 155 pp.

Contains an analysis of scholarships and fellowships awarded at institutions of higher learning in the United States in 1927 and 1928, state scholarships, privately endowed scholarships, and a list of publications listing scholarships and fellowships for advanced study.

SOPER, WAYNE W. *The Use of the Elementary School Auditorium in Cities and Villages Under Superintendents*, University of the State of New York Bulletin, No. 990, Albany, N. Y., 1932. 64 pp.

Contains information on the physical aspects of the auditorium, organization, administration, community uses of the auditorium, and educative values.

EDUCATIONAL ADMINISTRATION AND SUPERVISION

CUSHING, HERBERT L. "The Present Status of Certification in Nebraska," *University of Nebraska Publication*, Educational Research Record, Vol. IV, No. 3 (February, 1932), 73-87.

A study of certification agencies in the state of Nebraska.

DUNN, FANNIE W. "Experimentation in Organization and Teaching in One-Teacher School," *Teachers College Record*, XXXIII (March, 1932), 494-504.

The author presents a description of the work in Quaker Grove one-teacher rural county school in Northern New Jersey.

HUTSON, PERCIVAL W. "A Neglected Factor in the Teaching Load," *School Review*, XL (March, 1932), 192-203.

The author presents a study of the teaching load from the point of view of the number of different pupils committed to a teacher for education during any given semester or year.

KEILHACKER, MARTIN. "The Preferences of German Pupils as to Sex, Age, and Appearance of the Teacher," *British Journal of Educational Psychology*, II (February, 1932), 25-45.

From a study of preferences of German pupils as to sex, age, and appearance of the teacher, the author concludes that girls prefer women teachers especially for class leadership, German and biology. For teaching qualifications men teachers are often preferred, especially for mathematics, physics and similar studies. The young and middle-aged teacher is unconditionally preferred by boys as well as by girls. Older teachers are rejected by the great majority of boys.

MORITZ, R. D. "Report of the Department of Educational Service of the University of Nebraska for 1930-1931," *University of Nebraska Publication*, Educational Research Record, Vol. IV, No. 2 (December, 1931), 41-55.

An analysis of the placement service of the University of Nebraska for 1930-1931.

PHILLIPS, MARGARET. "Professional Courses in the Training of Teachers," *British Journal of Educational Psychology*, II (February, 1932), 1-24.

A report on an enquiry into the value of professional courses in the training of teachers.

STUDIES OF LEARNING AND TEACHING

DAVIS, ROBERT A., AND BALLARD, C. R. "The Development of Research in Learning," *Journal of Educational Psychology*, XXIII (March, 1932), 226-235.

The authors present a statistical analysis of research studies of learning for the period 1890 to 1929.

GREENBERG, P. J. "Competition in Children: An Experimental Study," *American Journal of Psychology*, XLIV (April, 1932), 221-248.

From an experimental study on competition in building with blocks among kindergarten children, the author concludes that four fundamental factors affect the display of competition: (1) the degree of the child's understanding of the idea of excelling; (2) the degree of the child's ability to dominate the material; (3) the educational factors situation; and (4) individual temperament as a competitive factor. The growth of the competitive impulse seems to follow a well-defined and orderly course.

GRIFFITH, COLEMAN R. "Timing as a Phase of Skill," *Journal of Educational Psychology*, XXIII (March, 1932), 204-213.

The author presents an analysis of skill indicating the importance of timing.

JONES, EFFIE BUTLER. "A Comparison of Comprehension Results in Oral and Silent Reading," *Peabody Journal of Education*, IX (March, 1932), 292-296.

An experimental study from which the author concludes that comprehension in oral and silent reading varies with the individual. In general, however, the comprehension was higher with the silent reading group.

LONGSTAFF, HOWARD P. "Analysis of Some Factors Conditioning Learning in General Psychology," *Journal of Applied Psychology*, XVI (February, 1932), 9-48.

The author presents the results of a study of students' attitude toward the introductory course in psychology at the

University of Minnesota, also an experimental study of the relative effectiveness of the lecture and quiz and all-lecture methods of teaching. The author concludes that under the conditions surrounding this experiment there were no significant differences.

REBERT, G. NEVIN. "A Laboratory Study of the Reading of Familiar Formulas," *Journal of Educational Psychology*, XXIII (March, 1932), 192-203.

The author employs the eye-movement technique to the reading of formulas.

STEINER, MELVIN ARTHUR. "Yearly Variation in the Average Intelligence of Pupils Entering the First Grade," *Journal of Educational Psychology*, XXIII (March, 1932), 161-172.

From a statistical study of the I. Q. obtained from the Stanford revision of the Binet-Simon tests of pupils entering the first grade from 1921 to 1924 of the Ingram school, Ingram, Pennsylvania, and from a study of the I. Q. obtained from the Detroit first grade test of pupils entering the first grade from 1925 to 1930, the author concludes that there is a real relationship between the I. Q.'s of first grade pupils and their later school achievement.

CURRICULUM CONSTRUCTION

CAIN, WILLIAM R., AND BROWN, FRANCIS J. "An Evaluation of the Outside Reading Interests of a Group of Senior-High-School Pupils," *Journal of Educational Sociology*, V (March, 1932), 437-442.

An evaluation of the outside reading interests of adolescent children. The books include those read during the summer vacation and first three months of the school year, exclusive of school assignments.

NEMZEK, CLAUDE L. "English Programs of High Schools in Iowa," *School Review*, XL (March, 1932), 221-226.

This study gives information concerning the work in literature and composition of English programs of 257 high schools in Iowa during 1929.

RODEAN, WILLIAM A. "Overlapping of Content in Textbooks in General Science and Biology," *School Review*, XL (March, 1932), 213-220.

From an analysis of nine textbooks, the author concludes that little attention is given to the question of overlapping, and that most of the harm done by such overlapping is due to the fact that it is haphazard and unplanned.

PUPIL ADJUSTMENT

ISAACS, SUSAN. "Some Notes on the Incidence of Neurotic Difficulties in Young Children," *British Journal of Educational Psychology*, II (February, 1932), 71-91.

From an analysis of 572 letters relating to neurotic difficulties, the author concludes that there are neurotic difficulties of many different types, of varying grades of severity and persistence that are fairly common among children between the ages of one and six years.

SULLIVAN, ELLEN BLYTHE. "Emotional Disturbances among Children," *Journal of Juvenile Research*, XVI (January, 1932), 56-65.

The author summarizes her own point of view developed from a survey of experimental and theoretical literature and checked by clinical experience with reference to children suffering from a variety of emotional disturbances.

MEASUREMENTS, STATISTICS, AND METHODS OF EDUCATIONAL RESEARCH

ADAMS, HENRY F. "A Non-Intellectual General Factor," *Journal of Educational Psychology*, XXIII (March, 1932), 173-178.

From the use of golf scores made in tournaments from 1921 to 1931, the author obtains tables of coefficients of correlation that satisfy Spearman's tetrad difference criteria of "g" and "s."

BOWERS, HENRY. "Order and Frequency of Observations Recorded by a Group," *Journal of Educational Psychology*, XXIII (March, 1932), 221-225.

From a study of "observation" the author finds a fairly pronounced tendency for items in "reports" and in "description" to be recorded in the same mean order.

CARROLL, HERBERT A., AND URICH, ALVIN C. "Abstract Intelligence and Art Appreciation," *Journal of Educational Psychology*, XXIII (March, 1932), 214-220.

From applications of the Meier-Seashore Art Judgment test, the McAdory test, and the Miller Analogies test the author concludes that abstract intelligence has little if any relationship with critical ability in art on the college level.

MALLER, J. B. "The Measurement of Conflict between Honesty and Group Loyalty," *Journal of Educational Psychology*, XXIII (March, 1932), 187-191.

A study of the behavior of children in a controlled situation involving a conflict between group loyalty and honesty.

STRONG, EDWARD K., AND GREEN, HELEN J. "Short-Cuts to Scoring an Interest Test," *Journal of Applied Psychology*, XVI (February, 1932), 1-8.

The authors present data relating to the validity of short-cuts in scoring the Strong Vocational Interest test.

THOMPSON, GODFREY H. "The Standardization of Group Tests and the Scatter of Intelligence Quotients," *British Journal of Educational Psychology*, II (February, 1932), 92-112.

This paper summarizes the results of twelve years' experience in the making of group intelligence tests for local educational authority.

WHITE, H. D. JENNINGS. "An Application of Mental Tests to University Students," *British Journal of Educational Psychology*, II (February, 1932), 53-70.

The second part of a report relating to the use of mental tests with University students.

HIGHER EDUCATION

MOON, G. R. "Higher Requirements," *Journal of Higher Education*, III (April, 1932), 185-190.

The author offers data upon the results of a comprehensive program at the University of Chicago, aimed at the reduction of undergraduate failures. The personnel services were increased, the standards raised, but the number of failures among freshmen have not been materially reduced.

MISCELLANEOUS PAPERS

GRACE, ALONZO G. "Individual Differences in Adults," *Journal of Educational Psychology*, XXIII (March, 1932), 179-186.

The author shows that there are individual differences in adults, and that

there are marked differences in background, particularly, in the control over vocabulary.

BIBLIOGRAPHIES

EELLS, WALTER C. "Bibliography on Junior College," *Junior College Journal*, II (March, 1932), 354-356.

A continuation of a bibliography on junior colleges by Walter C. Eells (United States Office of Education Bulletin, No. 2, Washington, D. C., 1930).

TERRY, PAUL W. "Summary of Investigations of Extra-Curriculum Activities in 1930. II," *School Review*, XL (March, 1932), 182-191.

This is the second of two articles summarizing investigations relating to extra-curricular activities.

WOODRING, MAXIE N., AND FLEMMING, CECILE WHITE. "A Supplementary Bibliography on Study," *Teachers College Record*, XXXIII (March, 1932), 515-532.

An annotated bibliography relating to the subject of study, supplementing the bibliography "On Study" published in *Teachers College Record*, February, 1928.

REGNET, RUDOLF. "*Das Arbeitserlebnis des jugendlichen Werktätigen in der industriellen Grossstadt* (The Young Metropolitan Industrial Worker's Attitude toward his Work)," *Zeitschrift für Angewandte Psychologie*, XXXIX, (June, 1931), 326-393.

The author came in touch with young socialistic and Catholic workmen in various workers' organizations in the Ruhr district, and has analyzed the young worker's attitude toward his vocation. The results of the investigation are: 47.9 percent consider work necessary to keep alive; 27.2 percent consider it a means to some life goal; 3.4 percent think of it as an escape from puberal-emotional crisis; and 21.5 percent consider it a duty to class and society. (E. Appelt, University of Wisconsin)

RIFE, DAVID C., AND SNYDER, LAURENCE H. "Studies in Human Inheritance VI: A Genetic Refutation of the Principles of 'Behavioristic' Psychology," *Human Biology*, III (December, 1931), 547-559.

The authors review certain misconceptions found in human psychology due to the neglect of genetics, and concludes that special abilities may develop to a marked extent in feebleminded individuals or even idiots quite in the absence of training or instruction. Such special abilities seem to be definitely due to heredity, and are not in any way connected with feeblemindedness.

HISTORICAL AND LEGAL STUDIES

BENSON, RICHARD M. "The Passing of the Protestant Secondary School in the West," *School Review*, XXXIX (December, 1931), 782-787.

A study of denominational secondary schools west of the Mississippi river. The author finds that sixty-nine percent of the denominational colleges of the west have abandoned their secondary departments.

WHITNEY, FREDERICK L. "Recent Legislation Affecting the Junior College," *School Review*, XXXIX (December, 1931), 775-781.

A survey of recent junior-college legislation from which the author concludes that on the whole the junior college is not only holding its own as an educational institution recognized by state statutes but becoming more firmly intrenched in the commonwealths where it has already been provided for.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Editor Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

National School Finance Survey.—The list of studies proposed to the Board of Consultants on February 18-20, 1932, by the associate director, Paul Mort, is as follows:

I. Financial Implications of Principles Underlying American Education.

II. The Present Status of Expenditures for Educational Purposes.
   1. Costs by Major Divisions of the School System, and by Functions.
   2. Expenditures for Education Compared with Expenditures for other Phases of Federal, State, and Local Government.
   3. Trend of Expenditures for Education in Relation to the Trend of Wealth and Income.
   4. Expenditures for Higher Education.

III. Predictable Changes in Expenditures for Schools.
   1. Average Salaries of Teachers in 1930.
   2. Factors Related to Teachers' Salaries.
   3. Trend of Teachers' Salaries.
   4. Secondary Education.
   5. Vocational Education.
   6. Special and Supplemental Education.
   7. Texts and Supplies.
   8. Transportation.
   9. Supplementary Study of the Costs of Transportation.
   10. Subsistence.
   11. School Libraries.
   12. Public Libraries.
   13. Health Service in Schools.
   14. Recreation.
   15. Capital Outlays.
   16. Private Education.
   17. Higher Education.
   18. Unit Costs of Instruction in Higher Education.
   19. Legal Status of the Junior College.
   20. Status and Trend of Expenditures and Sources of Funds for Junior Colleges.
   21. The Unit Cost of Junior College Instruction.
   22. Financing Education in Sparsely Settled Areas.

IV. School Indebtedness.
   1. Status and Trend of School Indebtedness.
   2. Legal Status of School Indebtedness.
   3. The Administration of School Bonds.

V. Educational Returns for School Expenditures.
   1. Educational Returns for School Expenditures in Each State.
   2. Educational Returns versus Expenditures.

VI. Sources of School Support.
   1. Sources, Amounts, and Percentage of Revenue.
   2. Tax Limitations and Tax Controls for Schools.

3. Tax Rates for Schools.
4. Delinquent Taxes and Their Effects on Schools.
5. Private Endowments and Gifts for Schools.
6. Exemption of Educational Institutions and Societies from Taxation.
7. Income Sources for the Support of Higher Education.

VII. Ability to Support Schools.
1. The Value of Education in the Economic Order.
2. The Equalization of the Support of Culture through the Equalization of Educational Opportunity.
3. The Economic Value of Education to the Individual.
4. The Ability of the States to Support Education.

VIII. State Support Systems.
1. A General Appraisal of State Support Systems.
2. Comparison of Methods of Distributing State School Aid with Those Used for Distributing Other Aids.
3. The Improvement of the Measure of Educational Need — The Pupil-Teacher Ratio.
4. The Improvement of the Measure of Educational Need—The Relationship between Cost per Unit of Average Daily Attendance in Rural High Schools and the Size of the School.
5. The Improvement of the Measure of Educational Need—The Control and Financial Implications of Pupil-Teacher Ratio.
6. The Improvement of the Measure of Educational Need—Transportation.
7. The Improvement of the Measure of Educational Need—Non-Resident Tuition.
8. The Improvement of the Measure of Educational Need—Capital Outlay.
9. The Improvement of the Measure of Educational Need—Extra Costs of Junior High School Organization.
10. The Improvement of Indices of Relative Ability to Pay.
11. Determining the Extent and Cost of Desirable Minimum Programs.
12. The Place of Conditioned Aids.
13. Appraisal of Present State Support Systems and Methods of Fiscal Management for Higher Education.
14. Relative Expenditures for Higher Education and Public Schools.

IX. The Federal Government and Financing Education.
1. The Measurement of the Educational Need of States.
2. A Technique for Distributing Federal Aid to States on the Basis of Wealth Produced.
3. A Comparison of Distribution According to Need and Distribution According to Wealth Produced.
4. Federal Aid for the Rehousing of Rural School Children.
5. The Federal Government and Financing Higher Education.

X. School Organization as Related to School Finance.
1. Administrative Functions Requiring an Administrative

Unit Larger than the School Attendance Unit.

2. Minimum and Optimum Size of Administrative Units.
3. Relation of Taxing Power to Local Initiative.
4. Methods of Redistributing Indebtedness in Reorganized Territory.
5. Overlapping Tax Districts.
6. Relationship Between Organization and Finance in Higher Education.
7. Financing of a Dual System of Education.

XI. Increasing the Efficiency of School Expenditures.

1. The Elimination of School Waste.
2. Curtailments in the School Program.
3. Duplication in Public Higher Education.
4. Significance of Foreign Practices in the Financial Control and Support of Higher Education.
5. Effectiveness of the Control of Public Permanent School Funds.
6. Business Management in Higher Education.

XII. School Financial Accounting, Budgeting, Auditing, and Reporting.

1. The School Clerk.
2. School Financial Accounting.
3. School Financial Reports and Statements.
4. School Financial Auditing or Inspecting.
5. School Budgeting.

XIII. The Bibliography.

Projects of the Survey of Teacher Education.—The National Survey of the Education of Teachers is now past the halfway point of its three-year period. The studies started or completed, arranged approximately in the chronological sequence of initiation, and the workers responsible, are as follows:

I. Bibliography on the Education of Teachers (Gilbert L. Betts, assisted by Benjamin W. Frazier and Guy C. Gamble).

II. A History of the Education of Teachers in the United States (Benjamin W. Frazier).

III. Supply and Demand Study—Inquiry I (469,000 returns, Guy C. Gamble).

IV. Supply and Demand in Teaching—As Shown by Reports and Other Data Available in State Departments of Education. (This study was made in coöperation with the Research Division of the National Education Association. It was directed by Frank W. Hubbard, and was published as a Research Bulletin of that organization in November, 1931).

V. A Study of Curricula for the Education of Teachers. (This project is under the immediate supervision of W. E. Peik, University of Minnesota, for the junior colleges, colleges and universities, and Earle U. Rugg of Colorado State Teachers College, for the normal schools and teachers colleges. The study of educational theories and social attitudes is being directed by Robert B. Raup, Teachers College, Columbia University).

A. General curricular requirements in the education of

teachers as shown by answers to data blanks sent to nine hundred coöperating institutions.

B. A more intensive study of the curricula of institutions representing better practices in the education of teachers. For this study institutions are separated into two groups: (1) the normal schools and teachers colleges; and (2) junior colleges, colleges, and universities.

1. An analysis of catalogues of from sixty-five to seventy institutions in each group to discover the courses most frequently offered, the curricular patterns in terms of amounts and sequences, and such other curricula information as is obtainable from catalogues and printed announcements.
2. A study of representative courses in the education of teachers in about twenty-five selected institutions in each group. The ten most frequently offered courses in each of the sixteen to twenty major subject-matter fields will be selected.
3. Special visits by specialists in curriculum construction to selected institutions in each group.
4. An analysis of student permanent-record cards in twenty institutions in each group (a total of 4,000 cards).
5. A study of educational theories and attitudes on social problems held by staff members in the different subject-matter fields in twenty-five selected institutions in each group.

VI. The Measurement of Teaching Ability and Success (Gilbert L. Betts).

VII. An Analysis of Laboratory School Facilities and Practices in Different Types of Institutions (Frank K. Foster).

VIII. The Repetition of L. D. Coffman's Study of Teachers' Standards Made in 1911 (Benjamin W. Frazier).

IX. Reading Interests of Teachers in Comparison with Those of Other Professional and Social Groups. (This study was made under the direction of Douglas Waples, of the Graduate Library School, University of Chicago, as part of an investigation of the Committee on the Reading Interests and Habits of Adults of the American Association for Adult Education and the American Library Association. It was also subsidized by the Carnegie Corporation and the Graduate Library School of the University of Chicago).

X. An Analysis of Library Facilities. (This study was made by Douglas Waples in connection with other studies subsidized by the North Central Association of Colleges and Secondary Schools and the American Library Association).

XI. In-Service Education of Teachers (Ned H. Dearborn).

XII. An Analysis of Summer Schools as Factors in the Education of Teachers (Frank K. Foster).

XIII. Graduate Schools in the Education of Teachers (Walton C. John).

XIV. Study of Staff Members of Higher Educational Institutions Preparing Teachers (Guy C. Gamble).

XV. Certification Requirements in the Different States (Ward W. Keesecker).

XVI. Special Studies of Problems in the Education of Negro Teachers (Ambrose Caliver).

XVII. Additional Coöperating Studies by Individuals (usually Doctors' dissertations in universities).

XVIII. Special Studies. (The preparation of special supplementary reports on the more significant controversial issues in the education of teachers, on which the present survey studies have given but little additional information. These studies are to be prepared by recognized students of the problems and are to present both sides of the controversial issues with proposals for needed studies and for programs of future development).

XIX. Related Studies.

1. National Survey of Secondary Education.
2. National Survey of School Finance.
3. The special study of standards by the North Central Association of Colleges and Secondary Schools.
4. American Historical Association studies (investigation of social studies).
5. American Library Association study of library standards.
6. Association of American Colleges study of small liberal arts colleges.

Educational Research in New Mexico.—During the past two years the New Mexico state department of education, coöperating with the General Education Board, Senator Bronson Cutting, and the University of New Mexico, has been instrumental in establishing two major educational innovations in the state. In 1930 the San Jose Training School was established at Albuquerque for experimentation in the field of rural education and in the study of the education of bilingual children. The following year the General Education Board indicated its further interest in the educational problems of New Mexico by establishing a Division of Information and Statistics in the state department of education. These two projects already have shown much promise of aid in the solution of educational difficulties in the state.

The San Jose School, under the directorship of L. S. Tireman and under the general supervision of the state university, is undertaking to set forth scientific teaching methods in the education of Spanish-speaking children and in the training of rural-school teachers. The project, unique in its field, is making an attempt to diminish the "language handicap" or "mental confusion" of these children through intensive reading and language-activity programs. Well-qualified teachers, in charge of the six hundred children enrolled, are assisted by cadet teachers who are chosen from all parts of the state and who return to their re-

spective local schools after a short period of training. This procedure, together with the development of a model one-room school, the pre-kindergarten work, and the proposed part-time teaching of Spanish in all grades, indicates the far-reaching scope of the experiment.

The Division of Information and Statistics, indirectly connected with the San Jose Training School, is engaged in general educational research and coöperates with all agencies interested in a scientific educational program for the state. It is attempting to set up a uniform system of records and reports to the end that all schools, whether public or private, may submit comparable statistics to the state office. This project, together with the various studies of school finance, free textbooks, consolidation programs, and the re-organization of state and county educational administration, already has made the Division a valuable and definite part of state education in New Mexico. All educational agencies of the state have indicated their desire to coöperate to the fullest extent. The director is George I. Sanchez.

Michigan Office of Educational Investigations.—The first report of Clarence S. Yoakum, vice-president and director of the Office of Educational Investigations at the University of Michigan, is available. This agency is the successor to the Bureau of University Research, although not the same as the Bureau of Educational Reference and Research of which Clifford Woody is director. The activities and studies of the Office of Educational Investigations during 1930-31 have been concerned in part with: the division of the four-year liberal-arts curriculum into two parts (authorized in May, 1931), examinations, freshman application blanks, the orientation period, student success in relation to various factors, distribution of the instructional staff, a survey of the clerical staff, and a study of the administrative machinery of the university.

Iowa Research.—The research division of the department of public instruction of Iowa, which was created on January 1, 1930, to conduct two special surveys, has become a regular and integral part of the activities of the department. Some work which heretofore has been done by other members of the staff has been transferred to this division, and in addition to making special studies, the research work will be broadened more completely to serve the needs of the schools. Among the fields of service which will be represented are: (1) to plan, verify, and summarize statistical reports received from school districts of the state; (2) prepare blank forms and questionnaires; (3) summarize and interpret data for members of the department staff; (4) give informational service; (5) make research studies; and (6) encourage research in education by qualified agencies. At the present time activities of the division are confined to the field of school administration. Its studies are reported from month to month in the educational news bulletin of the department and also in a series of research bulletins. Eight numbers of this bulletin have been prepared and succeeding numbers will be issued from time to time.

Portland Investigations.—The Portland, Oregon, school system is actively engaged in a number of research projects. Members of the Grade Teachers' Association are interested in studying problems of public finance, especially as they affect the public schools, and are making

definite investigation of the taxation situation in the city, county, and state.

Revision of the entire curriculum into a unified activity program with special attention to the possibilities of maximum correlation is contemplated and preliminary research is under way.

The Elementary School Principals' Association is working on a number of group research projects, many of which will be reported in their annual yearbook. Among these studies an outstanding item is the construction and city-wide standardization of a complete set of achievement tests based upon the local curriculum. Another project is the development of a modern social science curriculum designed not only to provide a correlation of the various social studies, but also to give a new and modern point of view. All of these investigations are being carried on with the assistance of the department of research.

The superintendent's office is interested in the continuation of earlier studies designed to discover and reduce, if possible, the failure rate in elementary and high schools. There is under way a five-year study of the school histories of children admitted to the first grade with chronological ages below six years. Other studies include the measurement of progress in ungraded rooms and the retention of American history in the high schools after an interval of one year.

Jackson Projects.—The public schools of Jackson, Michigan, have incorporated in their progress card a character rating scale which endeavors to rate children in the development of the traits of: self-control, responsibility, respect for law, initiative, effort, courtesy, fair-play, social relationship, thrift in use of time, care of materials, and care of property. The unique feature of this scale is the provision made for deviation from the normal response for either the aggressive or retiring type. The rating is shown by a graph which is placed on the card four times a year. The traits listed have been analyzed by the teachers and pupils, the children supplying most of the material under the normal responses.

The method of guidance is indirect, except in specific cases where individual rooms or the student council in a building may be working toward a definite goal. All of the teachers were given a course in mental hygiene as a preparation for the inauguration of this program, the results of which have been encouraging. It is a step forward in bringing the school and home closer in their common task of making possible the child's normal development through his self-direction.

Bellingham Curriculum Reorganization.—In revising the program for the social studies and arithmetic the Bellingham, Washington, schools used the following plan of organization of coöperating groups and individuals:

1. Pupils, their needs and interests
2. Superintendent (administrative) with coöperation of:
3. Professional groups
   a. Primary Council
   b. Classroom Teachers' League
   c. Junior High Teachers' League
4. Principals and special supervisors—articulating
5. Special work committees—teachers
   a. General aims
   b. Subject matter
   c. Units of work
   d. Materials
   e. Activities
   f. Outcomes
   g. Teachers' library and bibliography
   h. Pupils' reference

6. Clerical force for assembling, typing, and mimeographing

Curriculum Reorganization in Baltimore.—Curriculum reorganization in Baltimore has been carried on continuously for the past ten years. During the last three years of this time the program has assumed three different aspects:

1. Intensive committee work which is continuous throughout the entire program. The committees are representative of different types of teaching situations and communities throughout the city. Each one numbers from six to nine members under the leadership of a principal, teacher, or other persons of recognized ability. These committees serve the function of developing, evaluating critically, and modifying the curricular materials.

2. Experimentation in the development and critical tryout of curricular materials. This experimentation is carried on by a group of teachers, usually numbering between fifty and seventy-five and especially selected by the supervisors on the basis of their teaching efficiency and personal interests. Care is exercised in selecting these experimental teachers in order that the curricular materials may be drawn from all types of pupils in the various communities of the city. Contact between the experimental group and the curriculum committees is maintained through joint meetings and a systematic scheme of reporting. The supervisors are active in their relationship to these experimental teachers. Thus, all curricular materials arise and are evaluated and modified in terms of this experimentation.

3. City-wide tryout of tentative curricular materials. This phase of the program is the most significant and likewise the most ambitious aspect of curriculum activities in Baltimore. It removes the function of curriculum making from a single group and makes it the concern of the entire teaching body. For instance, in a recent program, more than nine hundred teachers in Grades IV, V, and VI used the tentative units in geography and history in mimeographed form for one year before published courses of study in these subjects were issued. Reporting on this city-wide tryout was guided by a printed form whose use was voluntary. More than 1800 such reports were received, scrutinized, and used in the modification of the units and in the development of suggestions for differentiation of these materials. In this way both courses of study had been put into effect tentatively in every classroom before they were issued formally.

National experts in given fields came to the city at intervals for round-table conferences and addresses. Through this medium the curriculum workers involved are enabled to secure an enriched background and a unified point of view.

Objectivity in Philosophy.—A bulletin from the School of Philosophy of the University of Southern California, under the direction of E. D. Starbuck formerly of the University of Iowa, states that Southern California is interested in five types of value with which philosophy is concerned. These are: truth-values and how they function, or logic and epistemology; moral-values, or ethics; beauty-values, or aesthetics; ideal-values, or religion; and the synergic-values, as they may be called, or metaphysics, that is, the description and appreciation of reality in its entirety. Each of these fields of philosophy has been treated more and more objectively during recent years in the institutions doing graduate work in philosophy, including the Universities of Iowa and Southern California.

The bulletin contains an interesting statement describing philosophy as standing at the crossroads, paraphrased as follows:

American philosophy has been full of agitation during the last half century in the direction of empiricism. Strangely, almost no researches have been made that are concrete, specific, and scientifically controlled. This is a challenging epoch in the life of philosophy. It has now the free choice between becoming more and more esoteric in its interest or of becoming progressively more modern in attitude and technique until it functions helpfully in homes, schools, churches, vocations, and the personal life. Psychology would still be bookish and aloof had it not turned scientific. It is now helping with the useful work of the world. Philosophy is destined to follow. It is by accepting the inevitable trend of the past three centuries toward research that philosophy will be able to treat successfully the problems of metaphysics and epistemology. It is an open question whether the empirical sciences of physics, astronomy, chemistry, and biology are not now making more helpful contributions to the interpretation of the nature of reality than are the professional philosophers themselves. At any rate it is not well to live too much on borrowed wisdom. Painstaking studies have never failed to prove illuminating. It is through research that philosophy will demonstrate recurrently its right to stand high in the sciences.

Research of State Departments.—In January, 1931, the U. S. Office of Education issued in mimeographed form, as Circular No. 31, a List of Research Studies of State Departments of Education and State Education Associations, No. 1. No. 2 in the series, under date of January, 1932, Circular No. 44, lists studies reported from January 1 to December 1, 1932.

The information for this circular was obtained from replies to letters sent out in May and October, 1931, to state departments of education and state education associations engaged in research work. It has been supplemented by such data from other sources as were available. The entries are classified by subject, including 257 studies. A brief subject index and an index to the state departments of education and the state education associations mentioned are provided.

Study of Standards for Women as Household Employees.—Domestic service is one of the least standardized fields of employment with regard to hours, wages, and working conditions for women wage earners in the United States. Increasing effort, however, is being made by various agencies, training schools, and colleges, responsible for placing workers in full-time or part-time jobs in household employment, to formulate standards regulating their conditions of labor. A study of such standards for women now in force or advocated in certain places as a result of these efforts has been undertaken by the Woman's Bureau of the U. S. Department of Labor working in coöperation with Mrs. Anna L. Burdick of the Federal Board of Vocational Education. Questionnaires are being sent to the deans of women in all state colleges and universities and to a selected list of public secondary schools and training schools, as well as to certain employment agencies.

New Psychological Journal.—The Psychological Exchange will provide a list of psychological projects under way, vocational analyses dealing with research and placement possibilities in the various psychological fields, notices of those available for employment, graduate and undergraduate degrees awarded in psychology, and news of civil service examinations, fellowships, research grants, formation of clinics, and appointments

and resignations of psychologists. The editors are James Hargan and Norman Powell, 507 Fifth avenue, New York City. The publication will be issued bimonthly, beginning April 15, at three dollars per year.

Committee on Illiteracy.—The full report on the illiteracy status of the entire country is now available and for the first time both the National Advisory Committee on Illiteracy and the state committees have a clear picture of the problem before them. There are 4,283,753 persons in the United States over ten years of age who can neither read nor write. Prior to the taking of the national census in 1930, hundreds of thousands were taught to read and write through a vigorous campaign conducted jointly by the National Advisory Committee and the state committees. A systematic organization for combating national illiteracy thereby evolved.

The National Committee is one of President Hoover's outstanding commissions. It was appointed by Secretary Wilbur in November, 1929, and consists of more than one thousand citizens who are leaders in their special fields throughout the states. It has initiated a program nation-wide in scope to eliminate illiteracy, and its purposes have received wide endorsement. Recently state conferences have been organized in the various states to promote the work of eliminating illiteracy.

National Association of Commercial Teacher-Training Institutions.—In working toward its objectives of improvement of programs for training teachers of commercial subjects, elevation of standards for the certification of teachers of commercial subjects, promotion of research in commercial education, and promotion of appropriate recognition of commercial education among school workers, the Association has followed a fact-finding program. Attention has been given to determining the actual and desired practices in the teacher-training field with regard to curriculums. This study was undertaken and principles of curriculum building for commercial teacher training formulated by Paul S. Lomax and Herbert A. Tonne, of New York University.

In 1930-1931, the Association, under the leadership of the president, Ann Brewington, of the University of Chicago, undertook the formulation of definition of commercial education and a statement of the obligation and position of business education in the social and economic order. This attempt to define the scope, obligations, and position of business education is basic to the realization of each of the four objectives of the Association. This work is in charge of a committee of which F. G. Nichols of Harvard is chairman.

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